

# AAI

## **AUTOMOTIVE INDUSTRIES**

**AUTOMOTIVE and AVIATION MANUFACTURING  
ENGINEERING • PRODUCTION • MANAGEMENT**

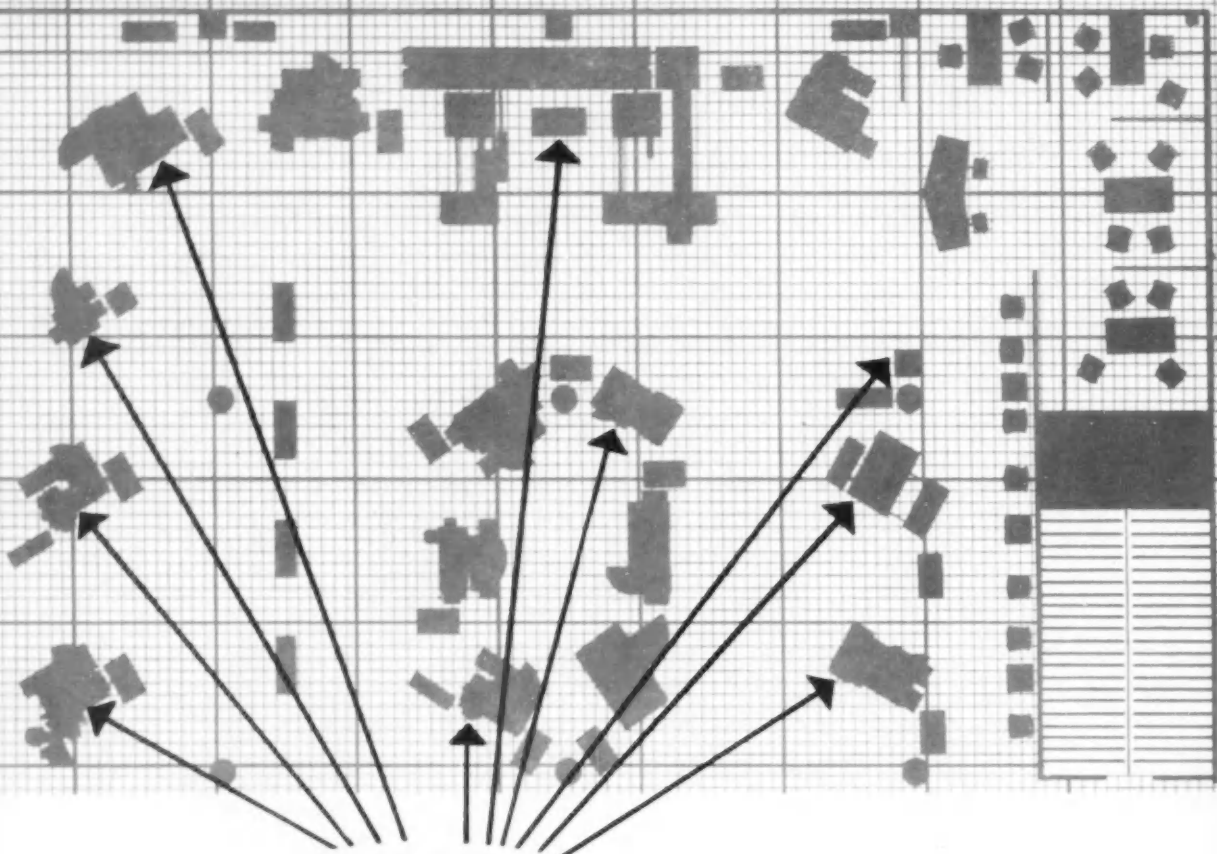
**AUGUST 15, 1955**

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Important Aspects of Amended Renegotiation Act  
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Aircraft Engine Plant with Centralized Lubrication  
New A-C Supply System Operates from Power Takeoff  
Special Equipment Used in Making Ford-O-Matics ...

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**A C H I L T O N P U B L I C A T I O N**



these **new** Heald developments  
are **TOP SECRET** now

**T**HE SIXTEEN Heald machines shown in the above floor plan of Booth 902, represent the very latest advances in modern precision-finishing methods and equipment.

Some of these machines are completely new—never before shown to the industry. Others demonstrate outstanding new developments and improvements that will mean faster, better production of precision-finished parts. All machines will be in operation, on appropriate work.

Here you will see new machines with mechanical cycling—new automatic sizing methods—new self-adjusting grinding cycles—new wheel dressing procedures—new after-gaging and feedback systems—a fully automated multi-unit horizing setup—and a completely new angle in Bore-Matic design.

This is real progress in precision finishing—progress that means a new, higher return on "the world's best investment, in action".

*...but you are invited  
to see them all,  
**IN ACTION**,  
in Booth 902  
at the Machine Tool Show*

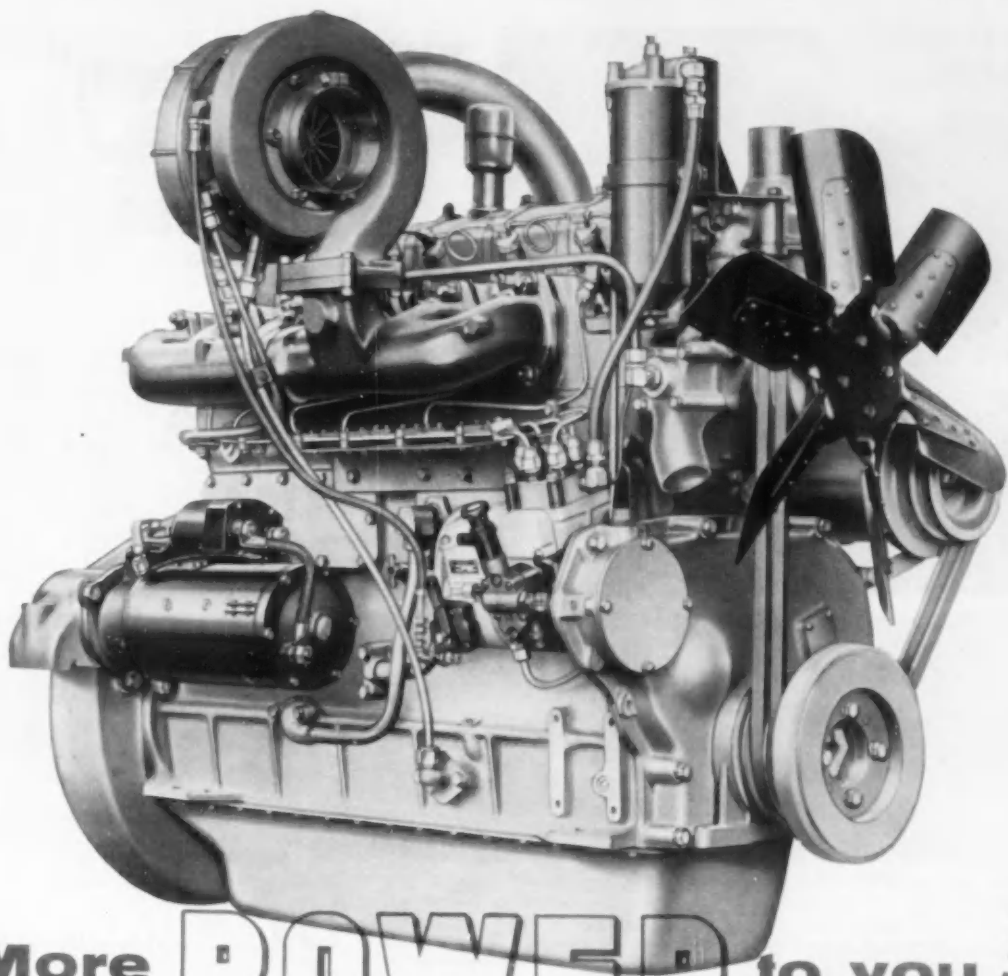
IT PAYS TO COME TO HEALD

**THE HEALD MACHINE COMPANY**  
WORCESTER 6, MASSACHUSETTS

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More **POWER** to you!

# WAUKESHA

## *Diesels*

Specifically designed for truck service—the Waukesha 135-DK Series high speed Diesels in the 130 hp to 190 hp range are setting high performance and economy records in re-powering 30,000 to 80,000 lb. g.v.w. units. Both are 426 cu. in., six-cyl., 4¼-in. x 5-in. The 135-DKB Normal Diesel develops 147 hp at 2800 rpm. In the 135-DKBS Diesel (shown) output is boosted to 185 hp at the same rpm by turbo-supercharging.

**WAUKESHA MOTOR COMPANY**  
 Waukesha Wisconsin  
 New York • Tulsa • Los Angeles





# "Welding team"

## helps huge bus fleet save engine blocks

*Ni-Rod and Ni-Rod "55" cut costs,  
simplify cast iron repairs*

**1. Good build-up** — Worn valve seat on an engine from one of the 720 busses operated by Niagara Frontier Transit System of Buffalo, N. Y., gets built up with Ni-Rod electrodes. Before being welded, the oil-impregnated casting was degassed in an oven for a half hour at 900°F. Then it was cooled, wire-brushed and preheated to 400°F.



**2. Like new with Ni-Rod** — Valve seat weld gets close inspection. Then the seat is re-machined. And finally it's pressure-tested. At this point, the men charged with maintenance of this huge bus fleet consider the valve head as good as new. They



give a lot of the credit to the soundness and machinability of Ni-Rod welds. Mr. W. W. Kunz, who heads the maintenance department says, "Using Ni-Rod and Ni-Rod "55" for repairs on 75 to 100 busses every year gives us a very substantial saving."

**3. Chalk one up for Ni-Rod "55"**, too — A crack that's dangerously close to the cylinder liner gets marked for repair with Ni-Rod's companion electrode, Ni-Rod "55". For stiff sections, like this engine block, and for heavier sections, high phosphorous irons, Ductile Iron, Ni-Resist® and high-strength cast irons, welders choose Ni-Rod "55". Like Ni-Rod, you can often use it *without preheat or postheat*.



If you work with cast iron, you can use this "welding team" profitably in your operation, too.

With Ni-Rod® and Ni-Rod "55"® you can, like this bus company, save worn or damaged cast iron parts that otherwise you'd scrap; and you can also simplify cast iron assembly work.

Ni-Rod and Ni-Rod "55" electrodes are easy to handle. And even welders of limited experience can produce sound, machinable welds.

Write today and ask for our FREE FOLDERS ON NI-ROD AND NI-ROD "55".

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67 Wall Street New York 5, N. Y.



### Welding Products

Electrodes • Wires • Fluxes



# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE PUBLISHED SEMI-MONTHLY

AUGUST 15, 1955

VOL. 113, NO. 4

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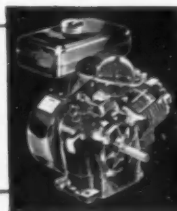
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# THERE'S JUST NO END TO THE END USES OF CONTINENTAL RED SEAL® POWER

Within Continental's range, from two to 1,100 horsepower, it would be hard to name a type of engine-driven product—vehicle, aircraft, boat, or industrial machine—of which one or more of the leading makes do not rely today on Continental power. As might be assumed from the current trend toward greater specialization, the list of such applications is longer than ever before. The field of Red Seal usefulness has broadened to the point where—as this list suggests—there is almost no end to the industrial uses of dependable Continental power.

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Continental also builds 4-cycle air-cooled models, from 2 to 3 h.p., for many industrial and farm applications, both conventional and vertical shaft. (AU series illustrated.) Advanced engineering gives them easy starting, high dependability, and unusual lugging capacity at low speeds. For information, address Air-Cooled Industrial Engine Div., 12800 Kercheval Ave., Detroit 15, Mich.

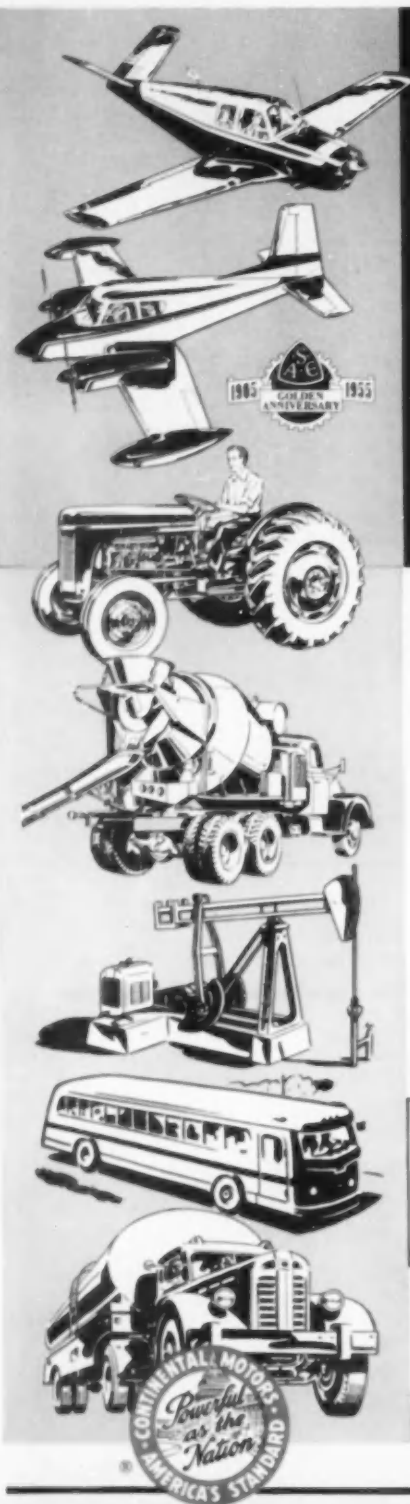


SERVICE FACILITIES AND GENUINE RED SEAL PARTS  
ARE AVAILABLE EVERYWHERE

## Continental Motors Corporation

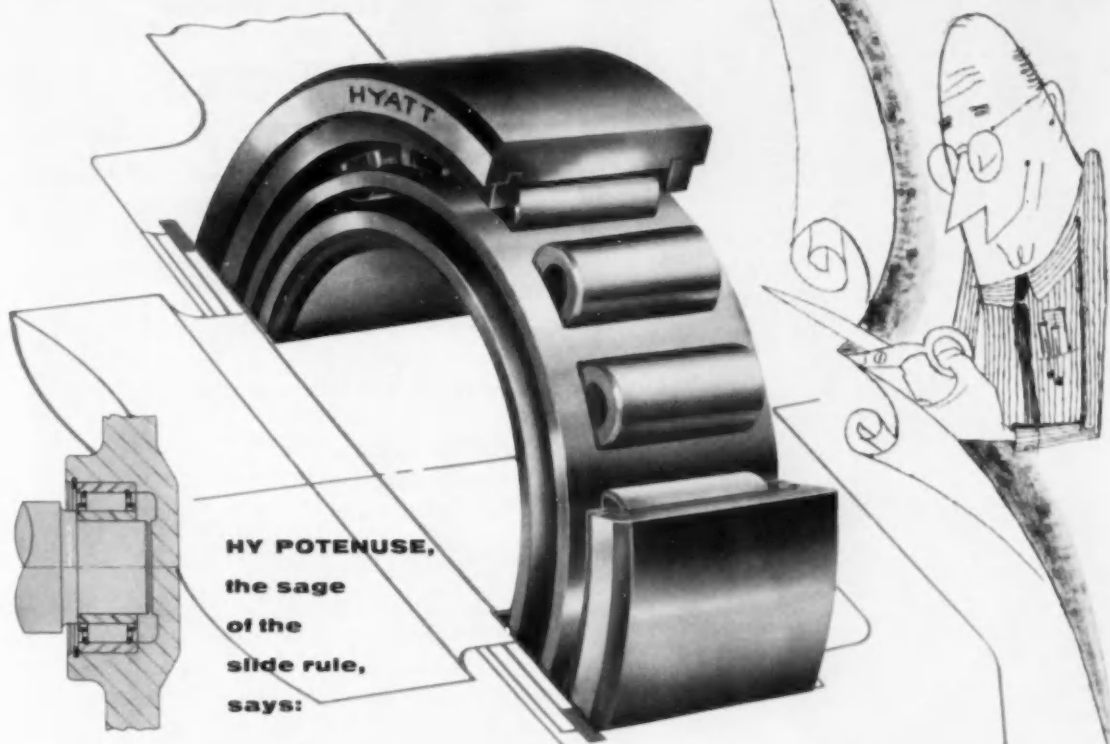
MUSKEGON • MICHIGAN

6 EAST 45TH STREET NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 910 SOUTH BOSTON STREET, ROOM 1008, TULSA, OKLAHOMA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA



**How Hy-Loads  
can help you . . .**

## **CUT INSTALLATION COSTS**



**HY POTENUSE,  
the sage  
of the  
slide rule,  
says:**

**You don't need a lot of extra "holding gimmicks" with HYATTS!**

**YOUR  
COMPLETE  
LINE OF  
CYLINDRICAL  
ROLLER BEARINGS**

Look at this speed reducer, for instance. The inner race of the HYATT Hy-Load is held on the shaft with a heavy press or shrink fit—*nothing more!* No money wasted for end clamps, threads, nuts, screws or washers. And brother, that rotating HYATT race will *never crack or come loose* come h--- or high water. Know why?

HYATT races are made from low carbon alloy steel which, after carburizing,

provides a *ductile core* and *case hardened operating surfaces*. That's why they'll *take* press fits and shock loads—that would be suicide for the through-hardened steel used by other bearing makers. Naturally, it costs HYATT more to maintain the industry's finest heat-treating facilities that make this extra quality possible—but *it sure saves trouble and money for every HYATTuser!* Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

# **HYATT**

**ROLLER BEARINGS**

**STRAIGHT**

**BARREL**

**TAPER**





Oil on the floor won't  
lubricate a bearing!

**Wherever throw-off,  
drip or squeeze-out  
is a problem...**

## **USE SUNTAC OIL**

### **OIL LEAKAGE MEANS:**

higher lubrication costs  
messy machines  
hazardous oil slicks on the floor

### **SUNTAC OIL:**

cuts leakage  
lowers oil costs  
minimizes hazardous floor conditions

In addition to its leak reducing properties, Suntac has all the high quality of expensive general-purpose oils. Suntac is fortified against oxidation to assure long oil life and against rust and corrosion to protect valuable machines. And, last but not least, because the leak-reducing agent is 100% petroleum, Suntac leaves no gummy film or residue.

For more information about Suntac, the oil especially made to prevent drip, throw-off and squeeze-out, see your Sun representative or write for your copy of Suntac Technical Bulletin to Sun Oil Company, Philadelphia 3, Pa. Dept. AA-8.



**INDUSTRIAL PRODUCTS DEPARTMENT**

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**Philadelphia 3, Pa.**

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YOU THINK  
OF  
**SEALING  
RINGS**

REMEMBER . . .

**Sealed Power**

**MAKES  
MOST  
OF  
THEM !**

**THAT'S RIGHT!**

Since automatic transmissions came into use, Sealed Power has made over 80,000,000 transmission sealing rings. It all began before World War II with sealing rings for tanks. Now we make them for passenger cars, trucks, and buses, as well.

There are 19 makes of cars now using automatic transmissions. 16 of these use Sealed Power sealing rings.

Sealed Power sealing rings are the product of 17 years of research and testing. They range from one inch to 14 inches in diameter.

They must seal oil pressure and they must be easy to install. Whatever your own sealing ring problem, Sealed Power is best qualified to help you. Write to us!

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PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings since 1911  
Largest Producer of Sealing Rings for Automatic Transmissions • Power Steering Units



**Precision Parts for**

**Piasecki**

**by GISHOLT Saddle Type Turret Lathes**

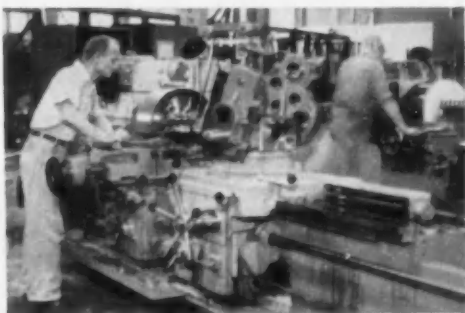
The latest thing in helicopters is the tandem transport—a remarkable development for vertical, forward and even reverse flying. Piasecki is a leader in this field, volume producing for the armed forces and commercial services.

Speed and accuracy are musts. And, here's why on this job (as on yours) Gisholt delivers both. You get more production because you can pour on all the power and speed the work and tools will take. The great strength and rigidity of Gisholt design assure lasting smoothness and accuracy.

**ALL THE FACTS** on Gisholt Saddle Type Turret Lathes, in five sizes, are yours for the asking, write today.

**GISHOLT**  
MACHINE COMPANY

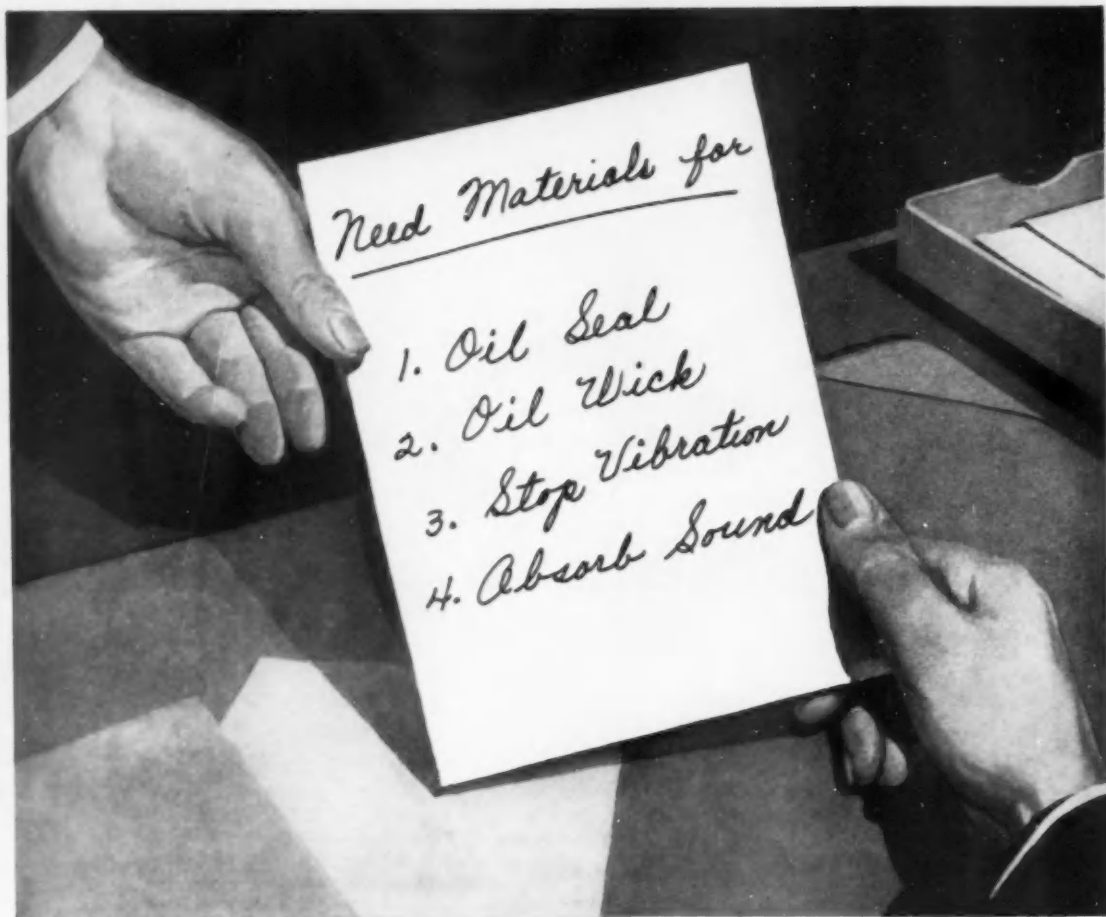
Madison 10, Wisconsin



2L Saddle Type Turret Lathe does simultaneous boring and turning on heavy transmission bushing for Piasecki Helicopters.

**THE GISHOLT ROUND TABLE**—represents the collective experience of specialists in machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

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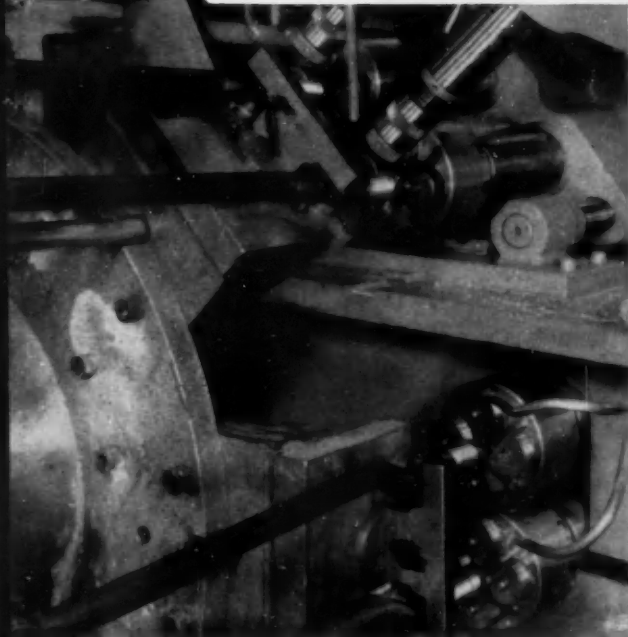
**MANUFACTURERS AND CUTTERS OF WOOL FELT**

Western Felts can be made as soft as virgin wool or as hard as bone—or any desired specifications in between. But always, their live fibers hold their shape. They never ravel or fray . . . resist wear, age, and weather.

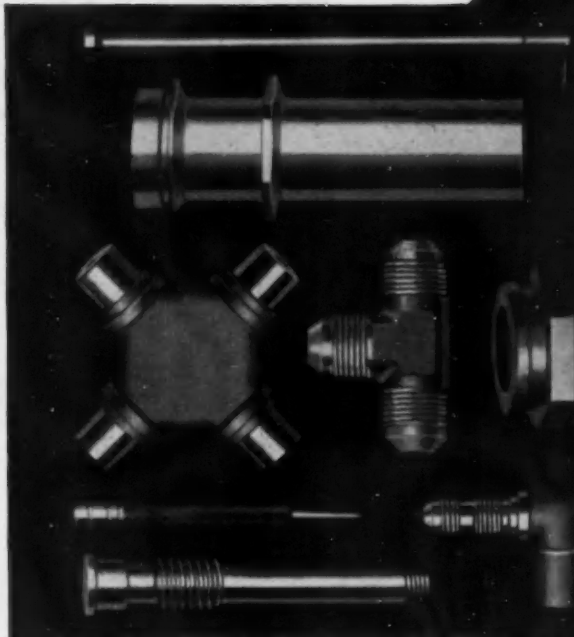
For over 56 years Western Felt has manufactured and cut specification felts for all industries. Whatever your problem, our experience can be helpful. Let our engineers investigate that possibility for you.



**for hollow milling... end forming and turning... for knurling, burnishing or threading—on short or long runs**



On this Cleveland tapping machine, two Namco Vers-o-tools with circular hollow milling cutters prepare these forged steel rods for threading in the next station where two Vers-o-tools are equipped with circular ground thread chasers.



To do threading and turning jobs like these and thousands of others, better and cheaper, investigate the Vers-o-tool system. Catalog DT-52 describes the method and shows the complete line. Our representative will give you the answers on your job.



## **NAMCO VERS-O-TOOLS** save time... tooling costs... additional grinding operations

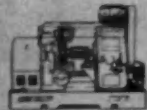
Hollow milling, even to a very close micro finish, is three times faster with multi-cutter Vers-o-tool Heads than with single point tools. Knurling and burnishing jobs show similar time savings and accuracies. Threading also costs less per piece because with the

**24-hour deliveries on most standard stockable chasers and blocks—NC, NF, National taper pipe and Dry Seal.**

Vers-o-tool "system" the guess-work is taken out of chaser grinding.

Further savings, too, in tool investment—chasers, cutters and rolls are interchangeable (size for size) in the same "double duty" Vers-o-tool heads.

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Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Swatches • Saws • Castrol Manufacturing

**THE NATIONAL  
ACME COMPANY**

173 EAST 131st STREET • CLEVELAND 8, OHIO

# United Takes Unusual Air Cleaner Design Problems *in stride*

United Specialties Company likes to tackle the "problem" air cleaners — those which cannot be easily adapted from the more than 250 standard designs which United engineers have developed. Here are two outstanding examples:

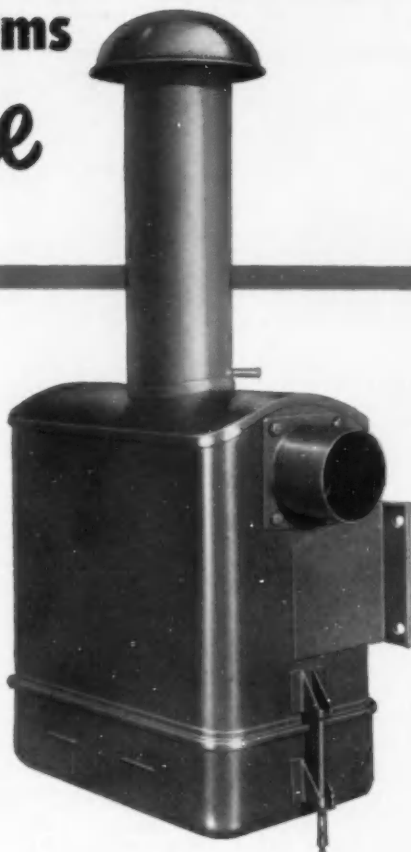
## RECTANGULAR CLEANER

This diesel oil bath air cleaner is designed to overcome crowded under-the-hood conditions. Its rectangular shape permits it to fit neatly into available space — provides more room for other accessories. It is available for truck and tractor engines, and for industrial power units.

## DUAL CARBURETOR CLEANER

This oil bath air cleaner, designed for use with dual carburetor, has a fixed fitting for one intake and an eccentric fitting for the other. This compensates for any tolerance variations — provides a perfect air cleaner connection to both of the carburetors.

• • •  
United Specialties Company builds a complete range of air cleaners for every type of



internal combustion engine. Special problems receive special attention from our design engineers. We invite your inquiry.



## UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28, Illinois  
Mitchell Division — Philadelphia 36, Pennsylvania  
Birmingham, Alabama

Air Cleaners • Metal Stampings • Rolled Shapes • Ignition Switches • Turn Signal Switches • Dovetails

# GIANT HD-21 CRAWLER DOZES with **m d** Supercharged Power!

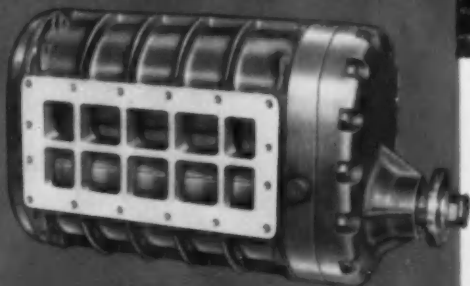


## ALLIS-CHALMERS STANDARDIZES ON MIEHLE-DEXTER SUPERCHARGERS FOR THEIR DIESEL ENGINES

Like so many leading Diesel engine manufacturers, Allis-Chalmers specifies Miehle-Dexter Superchargers for their engines.

And that's one of the reasons this new giant torque converter driven crawler tractor—the Allis-Chalmers Model HD-21—claims to be one of the most powerful crawlers . . . anywhere! Rough and rugged dozing needs power aplenty. And here's *extra* speed at any load, *extra* pushing or pulling power at any speed, wider speed range and more range overlap—thanks to Miehle-Dexter Supercharged Power.

You, too, can boost the horsepower of your engines by 50% or more . . . and decrease weight per horsepower, too. Miehle-Dexter engineers can specify the exact size and type M-D supercharger for your engines. Standard M-D models available for applications to 750 hp. Write for bulletin.



## FOUR FEATURES PROVE MIEHLE-DEXTER SUPERCHARGERS BETTER ON THE JOB

- Patented end plate seals eliminate metal-to-metal contact, assure longer life, help achieve fuel savings.
- Rotor wear strips eliminate contact between rotors and housing, assure longer wear.
- Lightweight aluminum rotors and aluminum case boost engine horsepower, do not add weight, safely allow high speeds.
- All parts are standardized, allowing easy field service and interchangeability.

NOW ON TEST . . .

AN ENTIRELY **NEW** TYPE  
OF **TURBOCHARGER!**



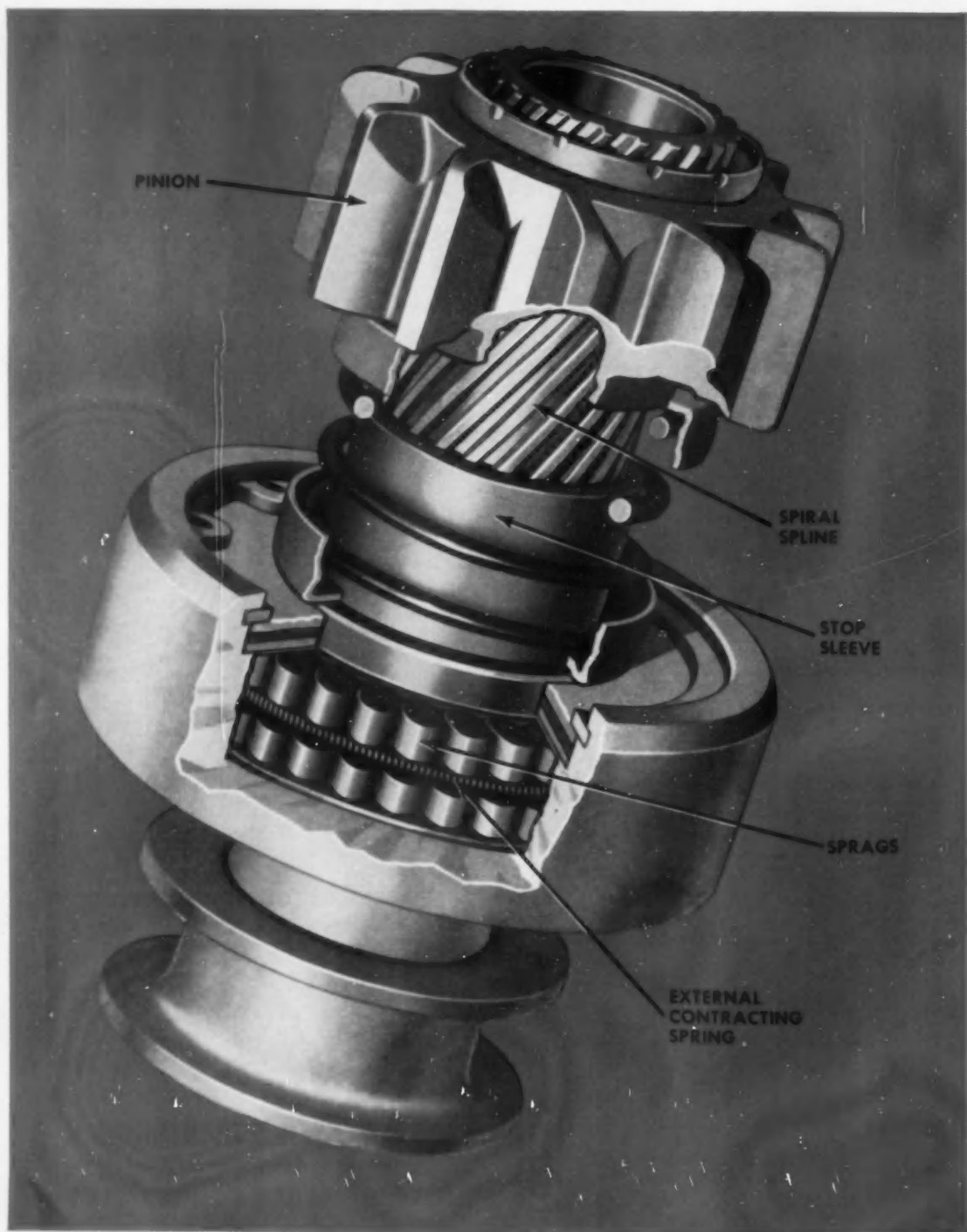
## MIEHLE-DEXTER SUPERCHARGER

Division of the Dexter Folder Company

100 Fourth Street

Racine, Wisconsin

# Progressive Engineering



# Makes the Difference

## **DELCO-REMY'S NEW HEAVY-DUTY SPRAG CLUTCH HANDLES HIGHER TORQUE LOADS**

Although no larger in size than earlier types of heavy-duty overrunning clutches, Delco-Remy's new *sprag* clutch has much higher torque capacity. Its remarkable increase in torque capacity is accomplished by a division of the load among 32 elements (sprags) rather than six rollers as in former overrunning clutches.

Other important mechanical features of the new clutch are . . . relative rotary motion between pinion and ring gear, provided by a spiral spline, which normally relieves tooth abutment on first attempts and insures starts on second attempts . . . stop sleeve which limits pinion travel to prevent "spinning meshes" if abutment is *not* relieved on first attempt . . . provision for *full* mesh engagement of pinion before cranking occurs to eliminate corner-of-tooth breakage and fatigue . . . low-friction overrun at high speeds provided by external contracting spring which automatically relieves tension on sprags under centrifugal force.

Specifically designed for cranking motor applications, this new sprag clutch is typical of Delco-Remy's willingness and ability to be ready when further advances in automotive electrical equipment are needed. This is Progressive Engineering at work.



**Delco-Remy**  
ELECTRICAL SYSTEMS

**DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA**





### CSR-200

First of Muskegon's famous "Unitized" chrome-plated multiple-piece oil rings... proved on America's greatest production lines and in the finest cars. Rails and spacer are correctly pre-assembled and "Unitized" to handle like a one-piece ring.

## MUSKEGON "UNITIZED" CHROME-PLATED OIL RINGS



# error-proof

... Installs faster than any other multiple-piece ring ... and without special installation tooling!

To err is human -- and very costly on the assembly line. But Muskegon's "Unitized" Piston Rings greatly reduce this cost because they are *always* correctly assembled, handle like a one-piece ring and install faster than any other multiple-piece ring -- without special installation tooling.

And what's more, Muskegon gives you *two* "Unitized" oil ring designs to choose from. The CSR-200, Muskegon's chrome-plated, all-steel, pre-assembled oil ring, has set new standards on the production line for faster, more economical and error-proof installation. Now the all-new CSR-400 offers all of the features of the CSR-200, *plus* the advantages of a revolutionary new circumferential expander.

The secret of their success is better design and Muskegon's patented "Unitizing" process. This process holds the pieces together in the right order for quick, easy installation. Then, in the first rush of hot oil, as the engine starts to run, the special adhesive dissolves completely and leaves the parts free to function independently of each other. The chrome-plated rails reduce ring wear and bore wear, scuffing and friction ... keep the engine new longer and increase oil economy.

But why take anyone's word for it but your own? Get the facts on Muskegon's CSR-200 or new CSR-400 rings for *your* engine.



### new CSR-400

Muskegon's most recent development... CSR-400 chrome-plated oil ring with circumferential expander! All four pieces are "Unitized," a Muskegon exclusive, for easy handling and installation.

Write us today.

DETROIT OFFICE:  
521 New Center Bldg.  
Telephone: Trinity 2-2113

**MUSKEGON**  
*Piston Rings*

MUSKEGON PISTON RING CO.  
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PLANTS AT MUSKEGON AND SPARTA

Since 1921... The engine builders' source!



## Riss Buys 500 **ROADRANGERS**

Riss & Company, Inc. of Kansas City, Mo., specified that every one of their new fleet of 500 tractors be equipped with a Fuller Semi-Automatic R-950-C ROADRANGER Transmission.

With single-lever control of all 10 forward speeds, the Fuller ROADRANGERS permit Riss drivers to anticipate grade requirements and meet them with the right ratio at the right time. The ten closely spaced ROADRANGER gear ratios can be readily anticipated and rapidly engaged,

without having to wrestle with gear splits or wait for automatic actuation. And with all forward ratios in even 28% steps, they can match power precisely to load and grade demands and at the same time save fuel by keeping the engine operating in the maximum horsepower range.

...

For the most efficient, easiest-shifting transmissions available today... specify Fuller Semi-Automatic ROADRANGERS for your fleet!

**FULLER MANUFACTURING COMPANY**  
(Transmission Division) Kalamazoo, Mich.



Unit Drop Forge Div., Milwaukee 1, Wis. • Slater Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.



# **DISSTON** **STAINLESS** **STEEL**

**... hot rolled  
to SHAPE**



## **saves steel · tooling · machining**

Stainless steel users receive many advantages by ordering Disston steel shapes accurately rolled to their specifications.

**LESS MACHINING.** Tool operations are simplified, for Disston shapes are rolled to precision tolerances, have exceptionally fine finishes.

**REDUCTION IN WASTE MATERIAL.** Preshaped Disston steel reduces scrap losses. One well-known manufacturer saved 47% of stainless steel tonnage by starting with a rolled Disston shape—instead of a rectangular section.

**LOW-COST HANDLING OF SMALL ORDERS.** Jobs as little as five or ten tons on a particular shape are rolled easily, economically in the Disston mills. Over 100 years of leadership in the rolling of special shapes gives Disston the edge in metal-shaping skill and technique.

Why not talk over your requirements with a Disston representative? Learn how much you can save by using Disston stainless steel shapes. Or write to:

**Henry Disston & Sons, Inc., Steel Sales Division**  
**831 Tacony, Philadelphia 35, Pa., U. S. A.**

**DISSTON HAS THE EDGE®**

in special purpose steels  
and special steel shapes.

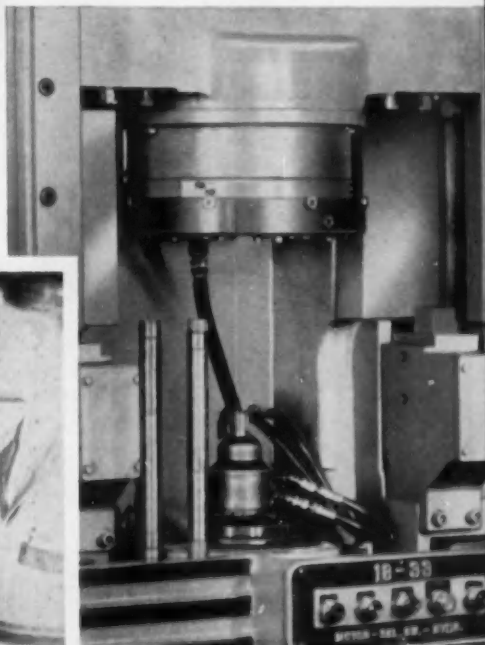


## This Month's GEAR PIX



**AUTOMATED SPEEDER**... facilitates speeding of production gears in mesh with an accurate master or a master mating gear. Inspector places gears to be speeded in the chute, and flicks a lever to divert any rejects that exceed sound level requirements. Cycle time on helical gear shown is 6 seconds.

**12 & 15 SECONDS**, respectively, is the cutting cycle time for the 7/8" and 1 1/4" width splines on an 18-33 Shear-Speed gear shaper. The 28-tooth, 24-pitch splines are formed on a relatively thin-walled hollow shaft adjacent to bearing surfaces.



**SPLINES ON AXLE SHAFTS** cold formed automatically on the Roto-Flo spline roller. This will be on exhibit at the Machine Tool Show.



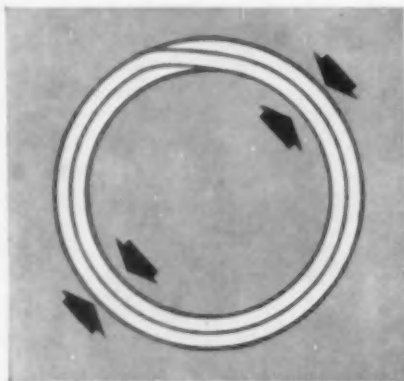
**MICHIGAN  
TOOL COMPANY**

7171 E. McNICHOLS RD. • DETROIT 12, MICH.  
IN CANADA: COLONIAL TOOL CO., LTD.

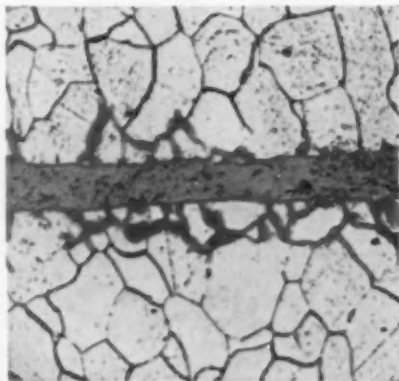
# Only Bundyweld steel tubing

## Here's why Bundyweld STEEL Tubing is used on 95% of today's cars

The illustrations below reveal why Bundyweld is specified by automotive manufacturers where strength and durability of tubing are essential. Bundyweld is the only tubing double-walled from a single metal strip. This exclusive process gives Bundyweld superior strength properties. Yet, because of the conditions under which Bundyweld is brazed and cooled, it is uniform and easy to fabricate.



With Bundyweld's beveled edges and single close-tolerance strip, there's no inside bead. The tubing is uniformly smooth, both inside and out. It fabricates easily; can be bent to short radii. Copper coating, inside and out, facilitates soldering and brazing operations.



This view of Bundyweld's copper bond (enlarged 300 times) shows how the copper actually alloys with the steel . . . through 360° of wall contact. That's the secret of Bundyweld's outstanding resistance to high pressure and vibration fatigue.



### WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



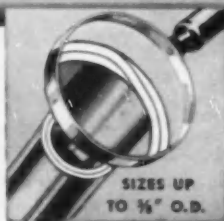
continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.



# can take punishment like this!



When automotive manufacturers attempt to build a hundred thousand miles into their cars, they know they must use only the highest quality parts. That's why Bundyweld STEEL Tubing is used in 95% of today's cars, in an average of 20 applications each. Only STEEL tubing is tough enough, rugged enough to take constant wear and tear.

Extra-strong Bundyweld Tubing is specified for

hydraulic brake lines, to assure safe stops; for oil lines, to save costly repairs; for gasoline lines, to assure leakproof performance; for push rods, to produce more powerful overhead valve engines.

**Backed by expert technicians**, Bundy offers advanced fabrication facilities and prompt, dependable delivery. Let us help you with your tubing problems. Write today for additional information.

## BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Harrings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Fairson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lopham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Los Angeles 88, Calif.: Tubex, Inc., 5400 Alcoa Ave. • Philadelphia 3, Penn.: Ryton & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Engle Metals Co., 4755 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., E. • Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.



## \* B-N.....your assurance of finer piston pin performance

The Burgess-Norton insignia symbolizes the engineering and production skill that guarantees better performance for industry.

Throughout the years the engineering, metallurgy and production facilities at Burgess-Norton have kept pace with the ever-increasing demands for quality parts. Ability to meet these requirements as to production and quality has made Burgess-Norton the world's largest independent producer of piston pins. Burgess-Norton is proud of its position . . . and with it accepts the responsibility to maintain constant vigilance in quality control, and makes available to industry the latest in manufacturing facilities and methods.

**A part is made right only when it is satisfactory to our customer**

**Burgess Norton Mfg. Co.**  
GENEVA, ILLINOIS



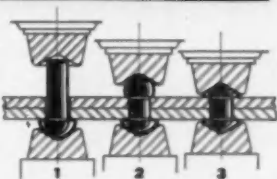
**SERVING INDUSTRY FOR OVER FIFTY YEARS**



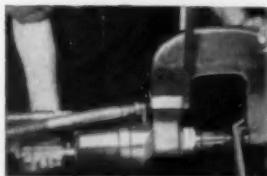
**WHY  
HANNIFIN  
"HY-POWER"  
RIVETERS  
SAVE YOU  
MONEY**

## **STRONGER JOINTS!**

This "silent squeeze" method gives you (1) rapid advance to riveting position, (2) high-pressure shaping of the rivet, cold or hot, and (3) automatic reversal as soon as the rivet is formed. Why are these rivets stronger? Because with this method the rivet shank expands to completely fill the hole and, as the metal flows to shape the heads, fillets are formed under both heads. The rivet is work-hardened, too, and every rivet is uniform.



## **FASTER RIVETING!**



Yes! From the time the button is touched it takes only  $2\frac{1}{2}$  seconds to head a  $\frac{3}{8}$ " rivet. "Hy-Power" is safe, too! For the stroke can be interrupted and the ram reversed automatically anywhere in the cycle, simply by releasing the control button.

## **QUIETER OPERATION!**

Here's the power source for this modern riveting method . . . it's the Hannifin "Hy-Power" Generator. This compact unit is a combination of motor, pump, oil reservoir, automatic control valves and high pressure intensifier that quietly supplies hydraulic pressure to . . .



. . . your "Hy-Power" cylinders—available in  $7\frac{1}{2}$ , 10,  $12\frac{1}{2}$ ,  $17\frac{1}{2}$ , 25, 35, 50, 75 and 100-ton capacities (more in multiple). Cylinders can either be mounted in yokes (portable or stationary) or installed in machines of your design.



### **GET THE FACTS!**

Get Bulletin 150. Learn why cost-conscious firms in many fields use "Hy-Power." Just write for your copy of this 32-page book. We'll mail it promptly.



# **HANNIFIN**

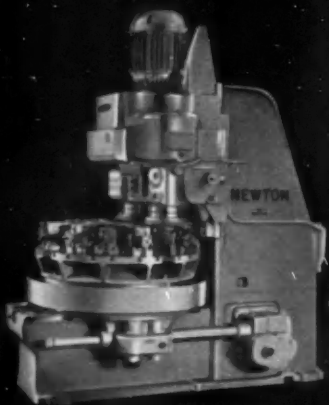
Hannifin Corporation, 543 S. Wolf Rd., Des Plaines, Ill.

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can lead to important savings  
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**Newton Vertical Rotaries**

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**CONSOLIDATED MACHINE TOOL COMPANY**  
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## FALLACIES AND FACTS FOR CARBIDE BUYERS

# Specifying "or equivalent" carbide on tool prints forces toolmakers to use cheapest grade

**Blunt — but needed — this clarification by the manufacturer of Carboloy Cemented Carbide shows how the practice of designating "equivalent" grades works against the user of carbide tools.**

Placing the phrase "or equivalent" on a tool print used to obtain competitive toolmakers' bids, does this:

It forces each toolmaker to quote on the basis of using the *cheapest* carbide — not necessarily the *best* carbide for your job.

The reason is obvious: To be competitive these days means submitting the lowest bid. Justifiably, your toolmakers try to keep their costs low. Consequently, they will use the cheapest available carbide, *if you give them a written mandate practically ordering them to do so.*

And you do give competing toolmakers this written mandate to buy the cheapest carbide, by giving them the option of selecting a so-called "equivalent" grade. By this practice, you force each toolmaker to protect himself by also looking for the *cheapest available grade.* As a result, the purchase is not made in terms of your production ability. *It's made solely on price.*

At the bottom of this kind of purchasing is the increasing promotion by some carbide manufacturers of the so-called "industry standard" or "equivalent" charts.

### **There are no "equivalent" charts**

*It should be recognized that no true industry standard or equivalent charts exist. Charts which show various manufacturers' grades of carbide, and suggest the types of machining operations for these grades, are "recommendation" charts. They were originally intended for use only to show the types of machining a certain group of grades would do. They were never intended to be used to show that the grades of carbide within a certain category would perform equally well and, consequently, could be used interchangeably.*

However, some carbide manufacturers have sought to benefit themselves by having their grades thought of as being "equivalent" to certain other carbides on the market. This attempt to sell by "association" is the real

reason behind the emphasis on getting carbide users to accept the so-called "equivalent" method.

### **"Carboloy" cannot be used to mean any brand of carbide**

Hand-in-hand with this type of carbide selling is the increasing word-of-mouth use of the registered Carboloy name to mean *any* brand of carbide. The name "Carboloy" is the registered trademark of the Carboloy Department of General Electric Company. As such, it is the brand name of our products alone. Strict insistence on the proper use of this name is our way of protecting both our customers and ourselves.

In many instances, carbide users have complained to us that they have purchased tools with "Carboloy" which did not perform to their expectation or past experience. Investigations showed that they had really purchased another manufacturer's carbides, but had been assured they had received "Carboloy."

Such free use of our name, we suspect, is a Penalty of Leadership.

### **Your only real test — production ability**

We offer this suggestion — when you buy or use carbides, find out for yourself which carbide will give you the *most production.* If you care to, ask a Carboloy sales engineer to help you run the tests — but you set them up, in your own shop. Then compute your carbide cost based on *production ability.*

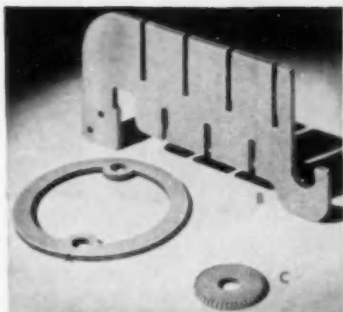
We have hundreds of in-plant case histories proving what our grades will do under any operating conditions. They show you how you get more for your carbide dollars when you specify Carboloy cemented carbides from your distributor or toolmaker. Write, or call, for assistance in getting the most out of your tooling dollars.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

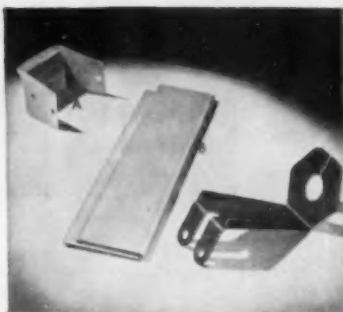
**CARBOLOY**  
DEPARTMENT OF GENERAL ELECTRIC COMPANY  
11151 E. 8 Mile Street, Detroit 32, Michigan

**Carboloy Created-Metals for Industrial Progress**





A. Sheet stock, shear strips, punch. B. Sheet stock, shear, punch blank, gang saw notches. C. Sheet stock, shear strips, punch blank, mill notches.



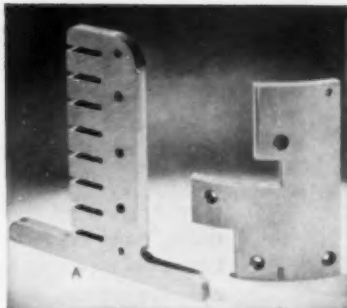
A. Sheet stock, shear strips, punch, form. B. Sheet stock, shear to size, drill, form. C. Sheet stock, shear strips, punch pieces, form in mold twice, rubber stamp twice.



A. Rod (hexagonal), smooth saw, automatic screw machine, turn shoulder thread, chamfer and cut off. Remainder are automatic screw machine parts made from Diamond Fibre by C-D-F.



A. Sheet stock, sand, smooth saw to size, smooth saw bevel, smooth saw corner cut out, drill. B. Sheet stock, hand saw, turn OD, bore ID, smooth saw side, drill five blind holes with jig. C. Sheet stock, sand, hand saw, rough bore ID, hob teeth, finish bore ID, machine keyway.



A. Sheet stock, sand, smooth saw, drill, smooth saw to shape, radius three corners, gang saw notches. B. Sheet stock, hand saw rough blanks, form, smooth saw width, length and shape, radius edges, drill with jig, countersink.



A. Tube, automatic screw machine, turn shoulders, chamfer and thread end, thread other. B. Tube (long pieces), smooth saw, tap threads, screw machine, (small pieces) auto. screw machine, thread, knurl, chamfer, cut off. C. Tube, smooth saw to length, punch twice, countersink. D. Tube, automatic screw machine, chamfer, cut off, punch.

## C-D-F fabricates and forms DIAMOND VULCANIZED FIBRE

**FAST . . . AT LOW COST . . . DEPENDABLY**

Vulcanized Fibre is a wonderful material if you know where to use it and how to buy it. We suggest on many jobs that it's best to do the fabrication and forming in C-D-F's shops. Why? Because C-D-F knows how. Since 1895 the company has put fibre to work in everything from buggy axle bushings to metal clad radio parts. The handling of thousands of set-ups for high speed, low cost production runs gives C-D-F an "experience bank" to draw from. Shop supervisors have a wealth of short cuts, little tricks that result in lower prices for you. They know the material and its peculiarities.

### **TOUGH, RESILIENT, STRONG**

How long has it been since you examined the unique properties and wide range of C-D-F fibre grades? Vulcanized Fibre is arc resistant, mechanic-

ally strong, non-corroding, half the weight of aluminum. Repeated moistening and drying in forming insignificantly alters the nature, structure or quality of the fibre.

Since C-D-F has their own paper mill, uniform, quality control is made possible. Special grades are more easily developed. A good example is C-D-F Abrasive Fibre, a medium density fibre with excellent resin and grit adhesion, now widely used for abrasive discs.

### **A BIG, RELIABLE SOURCE**

C-D-F does business with the largest

tonnage users of sheet, rod and tube fibre in the world. This means good deliveries, good prices, reliable products for every new customer. You deal with a materials engineer, a C-D-F man who knows how to give you the most value in Diamond Vulcanized Fibre. If you want to improve design, simplify purchasing, speed production, use Diamond Fibre and the facilities of C-D-F. Write for catalog, free test samples, or send us your print for quotation.



*Continental-Diamond Fibre*

**CONTINENTAL-DIAMOND FIBRE DIVISION OF THE BUDD COMPANY, INC.  
NEWARK 2, DELAWARE**

# LESS TORQUE

## In leather—NATIONAL MICRO-TORC<sup>®</sup>

TRADE MARK

**Lowest torque • Highest lubricity • No measurable leakage**  
**Runs cool, lasts longer • Sealing lip stores oil**

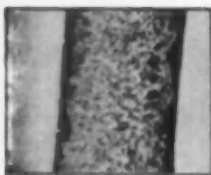


Fig. 1. National Micro-Torc Oil Seal. Oil cannot pass through elastomer coated side. Inner body retains natural porosity for "oil storage".

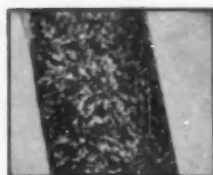


Fig. 2. Leather seal completely impregnated with rubber. Natural porosity of leather is destroyed by intense impregnation.

Shaft Size	Break Away Torque		Running Torque	
	Conventional Leather	Micro-Torc	Conventional Leather	Micro-Torc
1.300"	39 oz-in	7 oz-in	60 oz-in	56 oz-in
2.937"	126	39	253	164
3.812"	95	49	187	207

Fig. 3. Breakaway and running torque measurements, National Micro-Torc vs. conventional leather oil seals.

Test Conditions	NARS Micro-Torc		Completely Impregnated Leather Seal	
	C-1642	C-1643	D-100	D-101
Shaft Speed:	3200 RPM	3200 RPM	800 RPM	800 RPM
Shaft Size:	3.875"	3.875"	2.750"	2.750"
Shaft Runout, TIR:	.003"	.003"	.004"	.004"
Oil Temperature:	200° F.	200° F.	165° F.	165° F.
Test No.	C-1642	C-1643	D-100	D-101
Total Running Time:	1017 hrs.	1017 hrs.	108 hrs.	108 hrs.
Condition after Test:				
Sealing Member:	Flexible	Flexible	Very Stiff	Very Stiff
180° Bend Test:	Surface Cracks	Surface Cracks	Deep Cracks	Deep Cracks

Fig. 4. Service life test results. National Micro-Torc Oil Seals vs. completely impregnated leather seals.

Revolutionary new Micro-Torc Oil Seals, exclusively from National, employ a leather sealing member coated on the surface with a high lubricity elastomer. This coating not only reduces torque as much as 80% but effectively prevents lubricant leakage. Since the coating is applied to the outer surface of the sealing member only, the body of the sealing lip retains its natural porosity to store oil for periods of semi-starved operation. (Figure 1.)

The appreciable superiority of Micro-Torc over completely impregnated leather seals (Figure 2) is shown at left. In addition to a marked reduction in torque (Figure 3), service life of Micro-Torc seals was test-proven to be up to 10 times the life of completely impregnated seals, and 2 to 3 times that of wax or resin impregnated seals. (Figure 4.)

In dry-running life tests Micro-Torc seals operated for 100 hours at 1,350 rpm with no lubrication. No squealing or sloughing was experienced, and all Micro-Torc seals remained flexible and operative.

National Micro-Torc Oil Seals are recommended for application where temperatures do not exceed 200° F, shaft speeds are not over 2,000 fpm and runout is not greater than .010 indicator reading. For minimum torque, cool operation and long life in leather oil seals, specify National Micro-Torc. Write or telephone nearest National Applications Engineer for complete information.



## New! NATIONAL TORQUE METERS

New National Torque Meters provide a simple, accurate way to measure torque of oil seals. The meters are rugged, compact, easily portable, ideal for production line or receiving department. They have an easy-acting self-centering chuck for accurate seal holding, and use a simple taper-fitting test shaft you can make up in a matter of minutes. The Meters are designed for utmost simplicity, and with them unskilled personnel can make accurate torque readings with but a few moments training.

**Two sizes:** Model 615 fits seals up to 6" dia.; 15 lb. in. torque. Model 845 fits seals up to 8" dia.; 60 lb. in. torque.

**Meters measure** approximately 13" long x 10" wide x 11" high, weigh about 27 lbs. Sturdy carrying case can be furnished.

# with NATIONAL OIL SEALS

## In synthetic rubber—SYNTECH<sup>®</sup>

Low torque • Rubber-covered or ground O. D. • Long life  
Zero leakage • Unaffected by most industrial fluids



Fig. 5. Cross-section, typical National Syntech sealing lip. Note limited point of contact between seal and shaft.

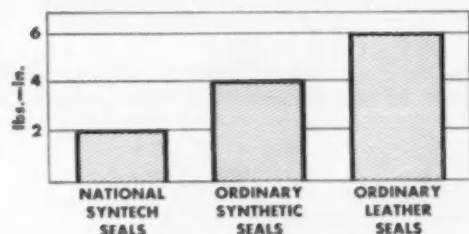


Fig. 6. Torque, Syntech vs. conventional synthetic rubber and leather oil seals. Seals tested on same shaft, under identical conditions.



Fig. 7. (Left) National Syntech Rubber-Covered O.D. (Right) National Syntech with machine-ground steel O.D.



Developed and introduced by National in 1946, National Syntech seals are among today's most widely used synthetic rubber oil seals. Their performance and dependability have been proven in thousands of commercial applications.

Syntech seals are particularly designed for higher speed, higher temperature applications where torque must be held to the absolute minimum. They feature an exclusive sealing lip design (Figure 5) which insures minimum contact between lip and shaft, yet provides zero leakage over a long service life. The marked difference in torque between Syntech and ordinary leather seals can be as much as 200%, as shown in Figure 6.

National Syntech Oil Seals are available in a wide selection of types and sizes, including seals with rubber covered or machine-ground peripheries (Figure 7) spring-tensioned or spring-less, or with twin or triple lips for special applications.

### Call in a National Applications Engineer

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### MORE INFORMATION?

#### NATIONAL MOTOR BEARING CO., INC. DEPT. D., REDWOOD CITY, CALIFORNIA

Please send complete information, illustrated technical details on  
Micro-Torc seals      Syntech seals      Torque Motor

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

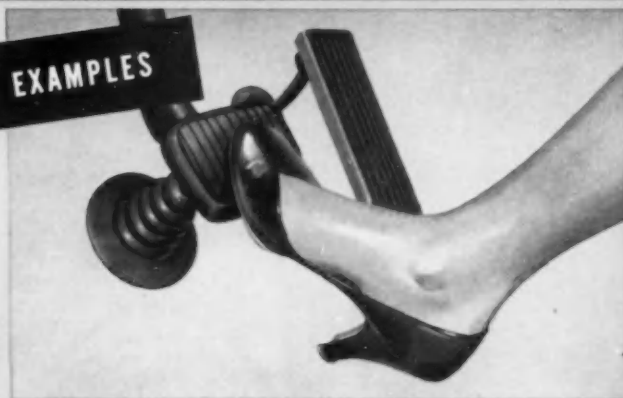
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**BENDIX LINKAGE TYPE POWER STEERING**—Because Bendix® Power Steering is of the linkage type, manufacturers find it especially adaptable for production line installation without extensive engineering changes. Manufacturers can now meet the ever-increasing demand for power steering more efficiently and more economically with Bendix Linkage Type Power Steering.

**BENDIX LOW PEDAL POWER BRAKE**—Specified by more car manufacturers than any other make, Bendix® Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from the go to the stop control. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety.

\*REG. U. S. PAT. OFF.

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AVIATION CORPORATION

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## High Spots of This Issue

### ★ Recent Developments in Optical Tooling

Spurred on by an awareness of previous inadequacies, major aircraft manufacturers have pursued a program of improving their optical tooling techniques. This article details various accomplishments along this vital line at Douglas Aircraft Co. See Page 50.

### ★ Newest Equipment for Making Ford-O-Matic Transmissions

In order to keep abreast of a sizable and persistent demand for Ford-O-Matic transmissions, Borg-Warner recently completed a 420,000 sq ft manufacturing plant in Illinois. Presented here is a graphic tour of the new modern facility. See Page 58.

### ★ Conveyor System in Canadian Engine Plant

This second section of a two-part article on McKinnon Industries, Ltd., is devoted mainly to a study of the distinctive system of Jervis B. Webb power-and-free conveyors. A complete description of the various ways engines are handled is given. Page 62.

### ★ Special Air Delivery for Testing Aircraft Devices

Temperatures as low as -82 F can be produced in air emitted from a new cooling unit installed by South Wind at its Indianapolis facilities. It is an invaluable aid in duplicating high-altitude or Arctic conditions for developing devices. Page 66.

### ★ Centralized Lubrication in Aircraft Engine Plant

Lycoming Div. of Avco Manufacturing Corp. found that maintenance lubrication costs could be cut as much as 50 per cent by a centralized set-up. How a variety of machine tools for aircraft engine parts are thus lubricated is discussed here. Page 70.

### ★ 45 New Product Items

#### And Other High Spots, Such As:

Renegotiation; self-energizing brake; nut runners; supersonic fighter; ac supply system; rocket testing; convertible car; and huge centrifuge.



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**Automotive and Aviation News, Page 33**

**AUTOMOTIVE INDUSTRIES COVERS**  
 PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
 • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •  
 PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT  
 SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT  
 ENGINEERING • PRODUCTION • MANAGEMENT



# A word about the Steel Situation

You may be wondering what new supply problems you will have because of the recent set-back in steel production. Strike-loss estimates run to nearly a million tons—and even before the strike, spot shortages had already been created by high demand.

In this emergency period, as always, Ryerson stocks undoubtedly can help you. Thousands of tons of certified quality steels are on hand at your nearby Ryerson plant—carbon steels, alloys, and stainless—and our stocks are being built up daily. In the few cases where the exact kind or size you need is not available locally we will check stocks at our 15 other plants for you.

Remember too that when you order from Ryerson you not only have the

world's largest reservoir of steel stocks to draw on, but also the advantage of our long experience, unequalled facilities, and complete dedication to quality of product and service.

So for help on emergency or regular requirements—call your nearby Ryerson plant today.

## PRINCIPAL PRODUCTS IN STOCK

**BAR, CARBON STEEL**—Hot rolled and cold finished—rounds, squares, hexagons, etc.

**STRUCTURALS**—Channels, angles, beams, etc.

**PLATES**—Welding and forming quality, abrasion resisting, E-Z-Cut, flange quality, safety plate, etc.

**SHEETS & STRIP**—Hot and cold rolled, many types and sizes, cut to exact sizes.

**TUBING**—Seamless and welded mechanical and boiler tubes, hydraulic tubing, etc.

**ALLOY STEEL**—All types including leaded alloys.

**STAINLESS**—Allegheny metal bars, plates, sheets, pipe, tubing, fittings, etc.

**BUILDING PRODUCTS**—Reinforcing bars, spirals, bar joists, wire mesh, etc.

**MACHINERY & TOOLS**—For metal fabrication.



## RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND  
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 113, No. 4

August 15, 1955

## 1955 Buick Production Is Highest in History

Buick early this month (August) reached another milestone with the production of the one millionth hardtop model. The division estimates that it will build about 470,000 hardtops during its 1955 model run out of a probable total production of 725,000 cars.

Total output of 1955 Buicks already has surpassed the 600,000 mark to set an all-time model year record. Market penetration this year has been the highest in many years in climbing to 11 per cent of total industry production for the first five months.

While specific details about the 1956 models are not yet available, one of the features to be offered will be safety belts as a dealer-installed option. Buick thus joins other manufacturers in making the safety device available on 1956 models.

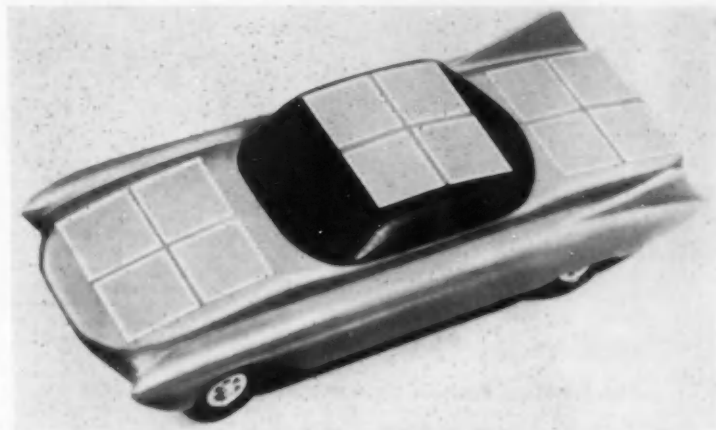
## Oldsmobile Turns Out Five Millionth Car

Oldsmobile last month (July 27) reached another milestone with the output of its five millionth car. The unit was produced in a little over 26 months after the four millionth car came off the assembly line.

## UAW Reduces Monthly Dues; Use of Funds Is Questioned

On the heels of a grand jury indictment charging that it violated the Corrupt Practices Act during 1954, the UAW-CIO announced that monthly membership dues will be reduced from \$7.50 to \$2.50 next month (September). The union last spring boosted the dues to build a \$25 million strike fund to enforce its demands for a guaranteed annual wage.

The indictment of the UAW contains four counts accusing the union of illegally using its general funds to



## GM SUNMOBILE OPERATES ON CONVERTED LIGHT RAYS

This Sunmobile model car runs on electricity which the 12 square photoelectric cells on its top convert from rays from the sun or other sources of light. To be demonstrated at the forthcoming GM Powerama, it is said to be the first such car ever built. GM points out that, although the 15-in. vehicle provides a glimpse of a possible future power source, solar power has at present no real automotive application.

support candidates during the 1954 election through UAW-sponsored television programs.

Walter P. Reuther, union president, who appeared before Federal Court on behalf of the union, has called the indictment "a Republican plot," and has pleaded innocent. Constitutionality of the Corrupt Practices Act may now be headed for a Supreme Court test.

Although the monthly union membership dues were reduced for the first time since prior to contract negotiations with car companies, it does not mean they will remain at the same level from here on in. Under the union's present plans, the dues will constantly fluctuate.

For example, whenever the strike fund falls to \$20 million, dues would be jacked up to \$3.50 a month to bring the total fund back to \$25 million. Dues would drop to \$2.50 each time the fund is built up to that figure.

## Second Stamping Plant Is Readied for Fisher

Fisher Body Div. will add a second stamping plant under GM's current \$500 million expansion program. Estimated to cost \$10 million, the new unit will be built on a 188-acre site near Marion, Ind.

It will provide more than 1.7 million sq ft of space and employ about 3000 persons when in full production. The division previously announced plans for a similar plant at Mansfield, O.

## Eaton Moves Stamping Work To New Plant in Cleveland

Eaton Manufacturing Co. is moving its stamping operations to another plant in Cleveland which is expected to boost production capacity by 40 per cent. The larger quarters, located a few miles from the present location, were acquired by Eaton last year.

# News of the AUTOMOTIVE



## HEAVY-DUTY WISCONSIN

Representing a substantial increase in maximum output over the single-cylinder Model ABN engine which it supersedes, the new Wisconsin Model ACN is the smallest unit in a current series of 12 models that are rated from 5.6 to 36 hp. Model ACN has a piston displacement of 14.88 cu in. and is designed to operate within a speed range of 1600 to 3600 rpm. It delivers from 2.3 to 5.6 hp., with a torque curve of 92 to 104 in.-lb. and can be equipped to operate on gasoline, kerosene, butane, propane, or natural gas.

## Machine Tool Business Up Again During Month of June

Boosted by \$11 million in orders from the Government, total machine tool business in June rose for the second straight month, although civilian orders dropped slightly. New orders in June climbed to more than \$77.5 million, highest since August 1953, and brought the total for the

first six months to nearly \$388 million, about \$100 million over the same period last year.

August should also be a big month for the industry, if the Government approves the \$50 million in Air Force orders currently under negotiations. The outcome is eagerly awaited.



## AUTOMATED JET PARTS

These two near-automatic machines, used at Ryan Aeronautical Co. in the manufacture of jet engine parts, are sparked into life by a push of one of the buttons on the panel at right. They are "scallop" heads so set that they can trim sixty 1 1/4-in. "scallops" to an accuracy of 0.0015 in. on housing assemblies of the Wright J-65 jet engine. The two smaller units on each side of the operator are drill heads.

## GM Increases Sales 29 Per Cent In First Half Over 1954 Period

Previous sales and profits records again were topped by General Motors during the first half of 1955. Although GM's defense sales in the first six months slumped by 25 per cent, the strong retail automobile market lifted total sales 29 per cent to \$6.513 billion, against \$5.066 billion in the like 1954 period. Net income climbed to \$661 million, compared with \$425 million last year.

Despite several brief wildcat strikes preceding and following contract negotiations with the UAW-CIO, GM's automobile production in the U. S. totaled 2,072,029 units in the six-month period, compared with 1,525,048 for the comparable 1954 months. Total factory sales of cars and trucks in the U. S. and Canada by GM were up 32 per cent over the like period last year in exceeding 2.4 million units.

Defense orders represented only 8 1/2 per cent of the total sales, compared with 15 per cent last year and a peak 22 per cent in the second half of 1953. GM's net working capital at June 30 totaled \$2.180 billion, substantially higher than the \$1.351 billion at Dec. 31, 1954.

Several other records also were broken by GM. World-wide employment during the first six months averaged 624,954 persons and payrolls amounted to \$1.563 billion, against an average employment of 596,294 and payrolls of \$1.329 billion in the first six months of last year.

Overtime operations boosted the average number of hours worked at GM plants to 43.5 hours a week, compared with 40.1 hours last year. Weekly earnings averaged \$103.09, compared with \$89.81 a year ago, according to the report.

## Federal-Mogul, Bower Merger Is Approved By Stockholders

The merger of Federal-Mogul Corp. and Bower Roller Bearing Co. has officially been approved by shareholders of both companies. More than 88 per cent of the stock of both companies was voted in favor of the merger. The former's name will be changed to Federal-Mogul-Bower Bearings, Inc.

# AND AVIATION INDUSTRIES

## Ford To Double Car Output At Rouge Plant Next Month

As production of 1955 automobiles nears an end, the industry now is preparing to start out its 1956 model run with a bang. Indicative of the high production pace that can be expected in the last remaining months of this year is the announcement that Ford will nearly double automobile output at the Rouge plant by putting it on a two-shift basis starting in September. Production on 1955 models is expected to be completed at the end of this month (August).

Present output of 600 cars daily will be boosted to more than 1000 units when the second shift goes into operation. Most of the Rouge output goes to dealers in Michigan, Indiana, and Ohio.

Major alterations are expected in plant layout, since the space to be used for expanded car output is now being used for building station wagon bodies. Production of station wagons reportedly will be moved to outlying assembly plants.

Basic changes at the plant will include relocation of trim lines and installation of additional material handling equipment. In addition, dock and storage facilities will be enlarged.

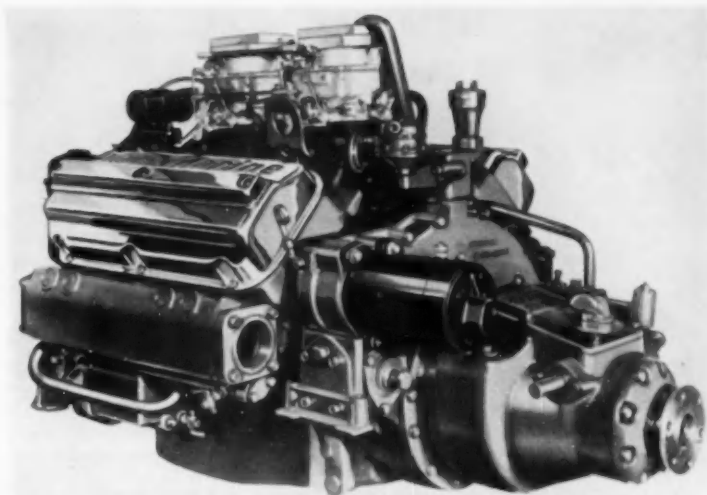
## Allis-Chalmers Net Dips Despite Higher Sales

Allis-Chalmers' sales for the first six months were up by more than \$8 million over the same period last year, but profits dipped from \$13.49 million to \$12.56 million. Sales for the period totaled \$267 million, against \$258 in the like period of 1954.

## Lycoming Gas Turbine Engine To Power New Bell Helicopter

A new gas turbine engine, the XT-53, designed and developed by Lycoming Div. of Avco Manufacturing Corp., will power the new XH-40 utility helicopter (see illustration) being developed by Bell Aircraft Corp. for the Army.

The XT-53, developed under a classified contract with the Air Force, is described as a "work horse" engine. It is designed for fixed-wing aircraft as well as helicopters.



## CHRYSLER ADDS 250-HP ENGINE TO MARINE SERIES

Latest addition to the Chrysler marine engine line is the Imperial V-250 with twin four-barreled downdraft carburetors, specially designed camshaft, and deep-breathing manifold. Supplied with either 8.2 to 1 or 7.2 to 1 compression ratios, the new engine has a displacement of 331 cu in. and will go into limited production this year.

The new engine is said to be the first free-power turbine with a front-end drive to be designed and developed in the U. S. For special applications of the XT-53, rear-end or simultaneous

power extraction at both ends of the engine can be accomplished. The helicopter version is rated at 825 hp for military power and 70 hp for maximum continuous operation.



Model of Bell XH-40 shows it to be a low, lightweight, single-rotor helicopter. Designed primarily as a front-line evacuation and instrument training craft, it can handle a variety of missions. It is rated in the 100 knot-plus cruising speed range and is capable of carrying a payload of 800 lb. according to Bell specifications.

# News of the AUTOMOTIVE



## CLARK DOZER IS DRIVEN BY TURBOCHARGED DIESEL

What is said to be the first rubber-tired bulldozer powered by a turbo-charged Diesel engine has been introduced by the Construction Machinery Div. of Clark Equipment Co. Named the Michigan Model 180 Turbo-Doser, the machine has a 165-hp rating and a capacity of 2½ cu yd. Operational photos show: upper left, at work on an earthmoving job; upper right, bowl can be tilted by operator while machine is in motion; lower left, four-wheel drive and rear-wheel power steering permit full power on wheels even while turning; and lower right, swinging drawbar for pulling and demountable pusher block are special features.

## Ottawa Steel Acquired By L. A. Young Spring

In line with its diversification program, L. A. Young Spring & Wire Corp. has acquired Ottawa Steel, Inc., Ottawa, Kan., for a reported \$1 million. The latter launched its diversification program last year with the acquisition of Daybrook Hydraulic Co., manufacturer of hoists and power tail gates for trucks.

Ottawa Steel, roadbuilding and industrial construction equipment manufacturer, expects sales of \$3 million in 1955. It will now operate as the Young Ottawa Steel Div.

## Contract Talks Continuing In Automotive Industries

While the number of automotive companies agreeing to the UAW-CIO supplemental layoff pay plan continues to grow, there are still a great many of them whose final status on the issue remains unresolved for the time being. Among the bigger companies are included Chrysler Corp., American Motors Corp., and Studebaker-Packard Corp.

At press time, negotiations at

Chrysler, which opened on June 27, were still continuing in an effort to reach a satisfactory agreement. Both the union and corporation reportedly are in basic agreement on the adoption of improvements based on the Ford and General Motors settlements. Only some slight obstacles are said to stand in the way of final agreement.

Negotiations at American Motors resumed early this month. AMC is the only automobile company thus far to upset the general pattern in the industry by flatly turning down the union's offer last month.

No date has been set for talks at Studebaker-Packard, and it is not known yet whether each division will bargain separately with the union or simultaneously. Both contracts, signed individually before the two companies merged, expire by Sept. 1.

## Eaton Acquires Plant In Coldwater, Mich.

Eaton Manufacturing Co., Cleveland, has not indicated what it plans to produce at a plant it will open in Coldwater, Mich. The company reportedly plans to spend about \$100,000 to renovate the unit.

## S-P Cuts Quarterly Loss As Car Production Gains

Studebaker-Packard Corp. continues to reduce its losses. For the second quarter of this year the corporation had a combined operating loss of \$3.9 million, compared with \$5.6 million in the first quarter. Persistent production curbs at Studebaker, however, reduced total sales of S-P in the quarter to \$136 million from \$152 in the first three months.

When compared with last year, however, both divisions continue to make substantial production and sales gains. In the first seven months Packard more than doubled its output to 48,700 cars against 21,300 last year, as output of torsion-suspension-equipped cars climbed beyond original expectations.

Packard's original schedule called for installing the suspension system on 25 per cent of total output. For the seven months, however, torsion-suspension-equipped cars accounted for more than 65 per cent of output.

Although Studebaker's output in the first seven months was not as great as Packard's, the division also made material gains over last year. Studebaker production during the period totaled about 77,000 units, compared with approximately 48,000 in the like 1954 period.

## Many Aerial, Ground Displays Scheduled for Aircraft Show

Plans for the Fourth National Aircraft Show, to be held at Philadelphia International Airport from Sept. 3 to 5, are proceeding rapidly. Expected to attract some 300,000 visitors from all parts of the world, the exposition will feature precision and exhibition flying, as well as speed demonstrations, with extensive participation on the part of the military services. One of the stellar events will be the transcontinental Bendix Trophy Race from Los Angeles to Philadelphia.

In addition to the aerial program, all segments of the U. S. aircraft industry will display static exhibits of new aircraft and equipment. Included will be airframe, engine, and electronic manufacturers, builders of components, and accessory suppliers.



# AND AVIATION INDUSTRIES



## TRAVELING PAINTER

*This huge traveling paint booth, recently placed in operation at the Wichita Div. of Boeing Airplane Co., has increased efficiency in painting wing skins and spar chords for B-47 and B-52 bombers. The mobile booth, which moves along 100 ft of track, is over 17 ft high, 12 ft, six in. wide, and 11 ft deep.*

## New Ford Proving Ground Commences to Take Shape

Work got under way last month (July) on the first major phase of Ford's new proving ground north of Detroit with the award of contracts to two construction concerns. Track facilities and buildings are being erected at present at the 4000-acre site which, when completed, will give Ford a test area 10 times larger.

Slated for completion by the fall of 1956, the proving ground will include a five-mile, high-speed oval track, a 2½ mile straightaway, uniform test grades, and several durability loops. An operation headquarters, maintenance and storage garages, and other facilities will be set up.

## Comeback Success Is Apparent In Chrysler First-Half Report

For the six months ended June 30, net earnings of Chrysler Corp. totaled \$70.01 million, compared to \$15.79 million in the like 1954 period. Net sales for the first half were \$1.88 billion, compared to \$1.08 billion for the first six months of 1954. A record 900,546 cars and trucks were shipped to dealers.

# TABLOID

Holley Carburetor Co. has purchased a 200,000 sq ft building in East Detroit, Mich. It will be used for the production of aircraft fuel metering controls and other units and components.

\* \* \*

Ford Motor Co. of Canada will shortly make available safety belts as optional equipment in cars and trucks in Canada.

\* \* \*

Fairchild Aircraft Div. has announced plans for a 560-mph light jet transport plane.

\* \* \*

H. E. B. Machine Tools, Inc., has moved its executive and sales office from New York City to 708 Clare St., Lansing, Mich. . . . Wolverine Tube Div. of Calumet & Hecla, Inc., has opened new general sales offices at the Guardian Bldg., Detroit, Mich.

\* \* \*

Leece-Neville Co. recently opened its new 104,000 sq ft Cleveland, O., plant with an "open house."

\* \* \*

Curtiss-Wright Corp. has broken ground for its new aircraft research development center near Clearfield, Pa.

\* \* \*

Aro Equipment Corp. has purchased Ampac Laboratories Corp. . . . Frohman Manufacturing Co., Inc., has bought the Turbine Products Div. of Detroit Broach Co.

\* \* \*

Piasecki Helicopter Corp. is expected to change its name soon to avoid confusion with the newly formed Piasecki Aircraft Corp.

\* \* \*

Steel Founders' Society of America has moved to new offices at 606 Terminal Tower, Cleveland, O. . . . National Industrial Conference Board is now in its new offices at 460 Park Ave., New York, N. Y.

Austin Motor Co. recently held the first public demonstration of its gas turbine car. . . . Triumph TR2 sports cars will soon be available in U. S. showrooms with detachable hardtops.

\* \* \*

Bell Aircraft Corp. has disclosed that recent expansions have doubled the size of its rocket engine research and testing facilities.

\* \* \*

The new PD-33 axial flow turbo-jet engine, developed by Westinghouse Electric Corp., has successfully completed its initial military test.

\* \* \*

AP Parts Corp. has added 344 new items to its 1955 line of exhaust system parts. . . . Industrial Washing Machine Corp. has added paint spray booths, baking ovens, and flow coating machines to its line of products.

\* \* \*

Du Pont will start production this fall of a new polyethylene resin by a low-pressure process at its Sabine River Works.

\* \* \*

General Electric Co. has developed silicone rubber that is said to be capable of remaining flexible at 600 F.

\* \* \*

Barnes Engineering Co. has been designated as the new name of Olympic Development Co. . . . Name of the Van Cleef Div. of Johns-Manville Corp. has been changed to Dutch Brand Div.

\* \* \*

Aircraft Div. of Twin Coach Co. will operate the A. C. Smith plant in Buffalo, N. Y., if negotiations with the Air Force are successful.

\* \* \*

American Wheelabrator & Equipment Corp. has changed its corporate name to Wheelabrator Corp.

# News of the AUTOMOTIVE



## VETERAN AUTOMOBILE MAKER VISITS DU PONT UNIT

Pictured examining an Oldsmobile V-8 engine in operation on a test stand for solving fuel problems at the Petroleum Laboratory of E. I. du Pont de Nemours & Co. of Deepwater Point, N. J., is automotive pioneer M. E. Crow, President of the old Crow Motor Co. and a charter member of SAE. Mr. Crow was greatly impressed during a recent visit to the laboratory by the numerous instruments being used to test engine performance. Inset is an illustration of the three-passenger Clover Leaf Roadster with a four-cylinder L-head engine which his company formerly built.



## SUPER-SIZE BLADED BULLDOZER KNOCKS DOWN TREES

Designed to uproot heavy trees and underbrush with ease, the 120,000-lb LeTourneau Tree Crasher is equipped with special gigantic tires that can operate with air pressures as low as five lb. Each of the mammoth wheels has within its rim an individual LeTourneau Super-C d-c motor that is directly geared to deliver close-coupled driving power in either direction. These motors are driven by generators which, in turn, are driven by two GM 6-71 Diesel engines. Future models will also be available with Cummins HR-400 Diesel power plants.

## Studebaker '56 Door Latch Marks Interest in Safety

Studebaker-Packard's entry into the automobile crash research field further indicates the increasing interest in the subject by car companies. Such research has yielded car factories much valuable information, which may well lead to the adoption of many new safety features on cars in the future.

A new interlocking type of door latch, which many manufacturers will feature in 1956, is one of the outgrowths of the crash research conducted by S-P and several other car companies. Studebaker will install the new door latches as standard equipment on 1956 models.

In the S-P studies, cars are driven at 40 mph into a barricade to test the safety latch, designed to keep doors from flying open from the impact of collisions. The tests also determine how much energy is required to produce various types of skull fractures and other physical injuries.

## Offer of \$7 Million Reported For Pressed Metals of America

Financier Frederick W. Richmond may soon add another company to the string of concerns in which he has interests. Mr. Richmond and a group of investors have offered to buy Pressed Metals of America, Inc., Marysville, Mich., for a reported \$7 million.

Sale of Pressed Metals, one of the largest manufacturers of automotive suspension parts, is still subject to approval by stockholders, who will vote on the plan this month. Last April, the stockholders voted against a proposal to merge the company with the Bellanca Aircraft Corp.

Pressed Metals, which operates three plants, including Acorn Products Co. (a Detroit subsidiary), last year was reportedly on the brink of going out of business following loss of contracts from two automobile manufacturers. During the last five years, the company has grossed an average of \$13 million, and net earnings have averaged \$675,000. The proposed sale of the company culminates several months of negotiations.

# AND AVIATION INDUSTRIES

## Air Force Steps Up Output Of Two Jet Fighter Planes

Funds are being shifted by the Air Force from programs of lower priority to permit swift production of an all-weather jet interceptor and a day fighter which may fly at twice the speed of sound.

Planes to be built at rescheduled, faster rates are an interceptor version of the McDonnell F-101 Voodoo and the Lockheed F-104, which is said to be capable of speeds as high as 1320 mph. A new model of the F-104 is to be put into production earlier than was originally planned.

Stepped-up output of the two planes is ordered to strengthen the U. S. air potential at a time when the Russians appear to be boosting their aircraft production. An earlier move by the Air Force to oppose this threat was the order to raise the rate of B-52 bomber construction.

## Allison To Display Host Of Products at Powerama

The array of products to be displayed by Allison Div. at the forthcoming GM Powerama in Chicago points up the size of the exposition. Allison is one of nine GM divisions which will exhibit their products at the show, to be held in a one million sq ft area on Chicago's South Lake Shore Drive from Aug. 31 to Sept. 25.

Since air power continues to grow in importance in the country's industrial economy, the aircraft and allied equipment to be shown by Allison should be of particular interest. The Powerama will feature the first public display of Allison's J71 turbojet engine and the 501 turboprop engine, which was recently certified by the Civil Aeronautics Administration for commercial operation.

Other aeronautical products of special interest at the show will include a turbo-propeller nearly two stories high, scale models of the Navy's vertical takeoff aircraft—the Convair XFV-1 and the Lockheed XFV-1—the F-89D Northrop Scorpion interceptor plane, and two guided missiles—the Regulus and Matador.

In addition, the division will show a number of Diesel engines using Alli-

## ALL MAKES EXCEPT K-W SHOW GAINS OVER 1954

### 1955 Passenger Car Production

As reported direct to Automotive Industries by the car factories

	July 1955	June 1955	July 1954	Seven Months	
				1955	1954
Hudson	3,312	4,067	2,866	37,342	17,174
Nash	9,226	12,320	5,004	80,408	40,531
Total—American Motors	12,538	16,387	7,870	117,750	57,705
Chrysler	12,063	15,367	5,549	123,536	62,382
De Soto	8,431	10,521	4,980	86,326	42,190
Dodge	18,654	25,926	6,998	197,842	74,949
Plymouth	55,477	65,810	32,600	477,667	248,896
Total—Chrysler Motors	94,645	120,624	49,738	887,671	428,519
Ford	143,890	149,105	115,549	1,036,837	865,596
Lincoln	2,146	2,276	2,276	21,676	24,371
Mercury	23,095	40,909	18,533	266,995	171,660
Total—Ford Motors	170,065	192,162	136,358	1,327,508	1,061,627
Buick	71,622	63,373	43,120	496,679	330,162
Cadillac	12,876	11,562	10,651	95,079	72,382
Chevrolet	172,020	130,669	122,120	1,110,960	882,089
Oldsmobile	61,091	54,459	38,163	389,504	262,125
Pontiac	40,710	44,581	28,022	381,020	229,627
Total—General Motors	396,321	304,644	240,076	2,453,242	1,760,195
Packard	5,577	7,617	1,747	48,861	21,301
Studebaker	4,780	7,392	5,343	78,064	47,625
Total—S-P Corp.	10,277	15,009	7,090	125,525	69,226
Kaiser	18	594	30	1,002	5,099
Willys	18	594	438	5,677	8,797
Total—Willys Motors	18	594	468	6,679	13,896
Total—All Makes	660,784	649,420	441,600	4,918,375	3,398,178

son transmissions, starters, etc., a tank equipped with Allison's cross-drive transmissions, a 50-ton ore truck with Torqmatic Drive, and the Army's 200 mm atomic cannon whose trans-

porter is equipped with Allison's TX-500 transmission. A score of other smaller products made by Allison will round out the division's exhibit.

(Turn to page 180, please)



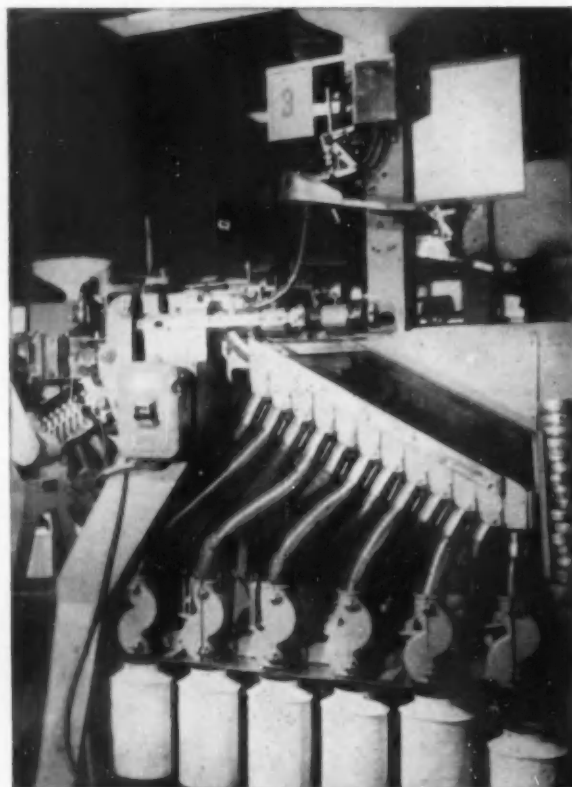
## TROOP AND CARGO TRANSPORT FOR LAND OR SEA

The YC-123E Pantomash assault transport plane, designed and built for the Air Force by Stroukoff Aircraft Corp., is shown in a recent demonstration flight at the Philadelphia Navy Yard. Amphibious, in addition to land, operations are made possible by a pair of retractable stressed steel skis, full buoyancy of the watertight hull, and the wing tip floats. Powered by two Pratt & Whitney R-2800-99W engines turning Hamilton Standard propellers, the plane has a cargo capacity of 14,100 lb.



THE NUMBER LM 67010 on the bearing cup together with LM 67084 on the cone means it's a new lower-cost, space-saving tapered roller bearing for front wheels. But when it's next to the trade-mark "Timken®", it has another important meaning: it tells you of the bearing's fine quality and the services that go with it and that it was made by the originator of its new design.

## The number with a double meaning



WE MATCH ROLLERS IN EACH BEARING to almost microscopic limits. Grinding and honing rollers to extremely close tolerances isn't enough. This machine sorts them into even more precise sub-sizes. Result: all the rollers in each bearing are the same size, each roller carries the same load. This assures quieter operation, longer life. It's just one more step we take to make sure Timken® bearings are the most accurate parts for your car's vital zone—the moving parts.



TO GUARANTEE THE HIGH QUALITY of the steel used in Timken bearings, we make it ourselves. We're America's only bearing maker that does. And we make the steel nickel-rich for added toughness. Although it's the finest bearing steel made, we're always looking for ways to improve it. For instance, we use this X-ray diffraction unit to study the residual stresses present in heat-treated steel parts.



OUR ENGINEERS WORK TO SOLVE YOUR PROBLEMS. We get valuable data from this rear axle oscillating test, which runs bearings under abnormal load conditions. For value, always specify "Timken" along with the bearing number. And for full value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

**TIMKEN is number 1 for VALUE where value counts most...in the vital zone**

NOT JUST A BALL  NOT JUST A ROLLER  THE TIMKEN TAPERED ROLLER  BEARING TAKES RADIAL  AND THRUST  LOADS OR ANY COMBINATION 

# Men in the News



*Harnischfeger Corp., Diesel Div.—Frank C. Edwards was elected vice-president.*

U. S. Rubber Co.—**H. Gordon Smith** has been elected vice-chairman of the board and chairman of the executive committee. **Chester J. Noonan** has been elected a member of the executive committee.

Formsprag Co.—**Charles F. Trapp, Jr.**, has been appointed sales manager.

Duo-Therm Div., Motor Wheel Corp.—**J. C. Carlton** has been named assistant sales manager.

Hudson Special Products Div., American Motors Corp.—**Robert F. Lang** has been appointed assistant director of industrial relations.

Clark Equipment Co., Construction Machinery Div.—**Daniel J. Youngerman** has been chosen purchasing agent.

Vickers, Inc.—**Gale H. Merrill** has become aircraft application engineer.

Chevrolet Motor Div., General Motors Corp.—**John L. Cutter** was named public relations director.

Henry J. Kaiser Co., Kaiser Engineers Div.—**T. A. Bedford** was named vice-president.

Plymouth Div., Chrysler Corp.—**C. Richard Johnston** has been named director of market analysis.

Brush Electronics Co.—**Curtis B. Hoffman** has been appointed vice-president of sales.

Republic Aviation Corp.—**Theodore Theodorsen** has been appointed director of scientific research.



*Diesel Energy Corp.—R. D. Friedlander has been appointed general sales manager.*



*Colonial Broach & Machine Co.—George Cameron and Gordon Cook have been named director of engineering and supervisor of broach engineering, respectively, of the organization.*

Westinghouse Electric Corp., Industrial Heating Div.—**L. R. Hague** has been named manager.

Jones & Lamson Machine Co., Marketing Div.—**George R. Morin** is now manager of industrial engineering.

Champion-Spark Plug Co.—**Roger Senez** has been made European sales manager.



*Flex-O-Tube Div., Meridan Corp.—Mel E. Maurer has been named president.*

Leece-Neville Co.—**Wallace T. Gray** is now general works manager.

Fairchild Engine & Airplane Corp.—**Warren R. Smith** has been appointed director of advertising, and **William G. Key** has been named director of public relations.

Detroit Transmission Div., General Motors Corp.—**Bernard W. Baldwin** was made personnel director.



*Kearney & Trecker Corp.—J. Robert Jones was named general sales manager, and John R. Joergers was made sales manager of the new Aircraft Machine Div.*

*Fruehauf Trailer Co. of Canada, Ltd.—R. J. Telford has been appointed president.*



Michiana Products Corp., Steel Fabricating Div.—**James W. Volk** has been named sales manager.

National Machine Products Co.—**Adolf A. Widmann** has been appointed vice-president in charge of engineering.

Kraus Automatic Machines Corp.—**Walter J. Niles** was elected president, treasurer, and a director.

Ray-O-Vac Co.—**A. M. Anderson** has been promoted to merchandising manager.

## Necrology

**Frank J. Hughes**, 58, director of contracts for the Crosley Div. of Avco Manufacturing Corp., died July 20, at Washington, D. C.

**Richard S. Reynolds, Sr.**, 73, founder and chairman of the board of Reynolds Metals Co., died July 29, at Richmond, Va.

**William B. Wilson**, 85, former production and personnel director of the old Durant Motor Car Co., died July 22, at North Plainfield, N. J.

**Rear Adm. Apollo Soucek**, 58, retired chief of the Bureau of Aeronautics, died July 22, at Washington, D. C.

**John H. Collier**, 70, former president and chairman of the board of the Crane Co., died July 27, at Fairfield, Conn.

**P. O. Stewart**, founder of Electro Products Co., died July 24, at Yonkers, N. Y.

**Burke Patterson**, past president of National Standard Parts Association, died recently, at Phoenix, Ariz.



*"To the success of your mechanism"*



<b>WALLACE BARNES COMPANY</b> BRISTOL, CONNECTICUT	<b>THE WILLIAM D. GIBSON COMPANY</b> 1800 OLYBURN AVE. CHICAGO 14, ILL.	<b>RAYMOND Manufacturing COMPANY</b> CORY, PENNSYLVANIA	<b>BARNES-GIBSON - RAYMOND</b> 40300 PLYMOUTH RD. PLYMOUTH, MICH.	<b>B-G-R COOK PLANT</b> ANN ARBOR, MICHIGAN
 <b>DIVISIONS OF ASSOCIATED SPRING CORPORATION</b> COAST TO COAST	<b>SEABOARD Coil Spring Div.</b> 19001 S. BROADWAY GARDENA, CALIF.	<b>OHIO DIVISION</b> 1825 EAST FIRST ST. DAYTON, OHIO	<b>WALLACE BARNES COMPANY</b> STATE FAIR BLVD. SYRACUSE 9, NEW YORK	<b>MILWAUKEE DIVISION</b> 341 E. ERIE ST. MILWAUKEE, WIS.
<b>DUNBAR BROTHERS COMPANY</b> BRISTOL, CONN.	<b>F. H. MAHROSS AND SONS CO.</b> BRISTOL, CONNECTICUT	<b>THE WALLACE BARNES CO., LTD.</b> HAMILTON, CANADA		

# performance proven *by millions of installations*

- "No Kick-Out" feature wins overwhelming approval from car, truck and tractor manufacturers

Although a comparatively new advancement in starter drive design, the Bendix® Folo-Thru Drive has already proven itself in millions of installations to be the most efficient starting equipment under all operating conditions.

The Folo-Thru type is specially designed to follow thru the weak explosions until the engine actually runs on its own power. Thus, quicker and more dependable starts are assured even under the most extreme weather conditions.

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Reversible Nutrunner

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- ☐ Please send me FREE booklet SP-3164 "Magnamatic Case Histories."
- ☐ Please send me "Magnamatic" Bulletin SP-3126.
- ☐ Have representative call.

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# NEW

Controlled-Torque  
power  
screwdriver-  
nutrunner

*the revolutionary CP "Magnamatic"*

with the  
one-shot clutch



An air-driven torque screwdriver-nutrunner that can be preset to run one screw or thousands\* to specified torque ... that's the CP One-Shot "Magnamatic."

In design and operation "Magnamatic" is entirely new, but thoroughly proved in more than eighteen months of field testing and operation on production lines:

—an Alnico magnetic One-Shot clutch, adjustable to specified torques, disengages completely the instant the fastener is driven to the desired tightness. The clutch does not impact or ratchet—the irritating "buzz" of conventional tools is eliminated. Inexperienced or fatigued operators can't burr screw heads, strip threads, shear fasteners, or damage work surfaces. It is impossible to overdrive a nut or screw with a CP "Magnamatic" no matter how long the tool is held on the work.

A complete line of One-Shot "Magnamatic" Screwdrivers, reversible and nonreversible types, in capacities from #4 screws to  $\frac{3}{8}$ " bolt size, is now in production.

\*On the assembly line of a midwestern manufacturer, an operator is running 16,000 #6-32 screws per day with "Magnamatic" to a critical torque specification.

#### ONE-SHOT "MAGNAMATIC" SCREWDRIVER-NUTRUNNER

- can be preset to drive fasteners to specified torques.
- maintains the selected torque setting indefinitely.
- has no clutch jaw wear.
- disengages the instant the fastener is run to desired tightness.
- eliminates the need for skilled operators.
- eliminates stripped threads, sheared fasteners, surface damages.
- prolongs service life of screw bits.



Reversible  
Screwdriver



Screwdriver



## Chicago Pneumatic

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# FOOTBURT

## *Sensitive*

### DRILLING MACHINES

A FULL RANGE  
DRILLING MACHINE  
ENGINEERED FOR  
PRODUCTION

■ Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitive are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counterboring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1, 2, 3, 4, 6 Spindle Models.

**THE FOOTE - BURT COMPANY**

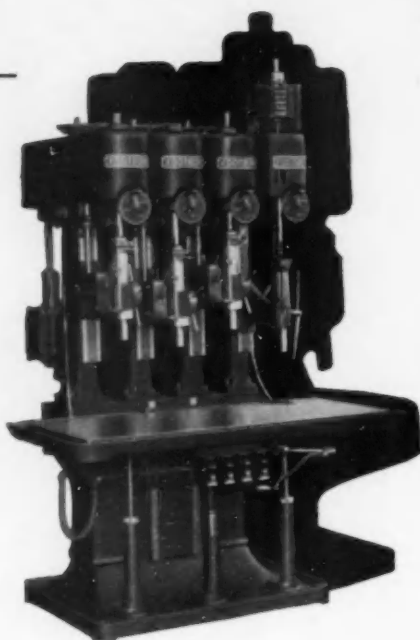
Cleveland 8, Ohio

Detroit Office: General Motors Building

★ *Engineered  
for  
production*

# FOOTBURT

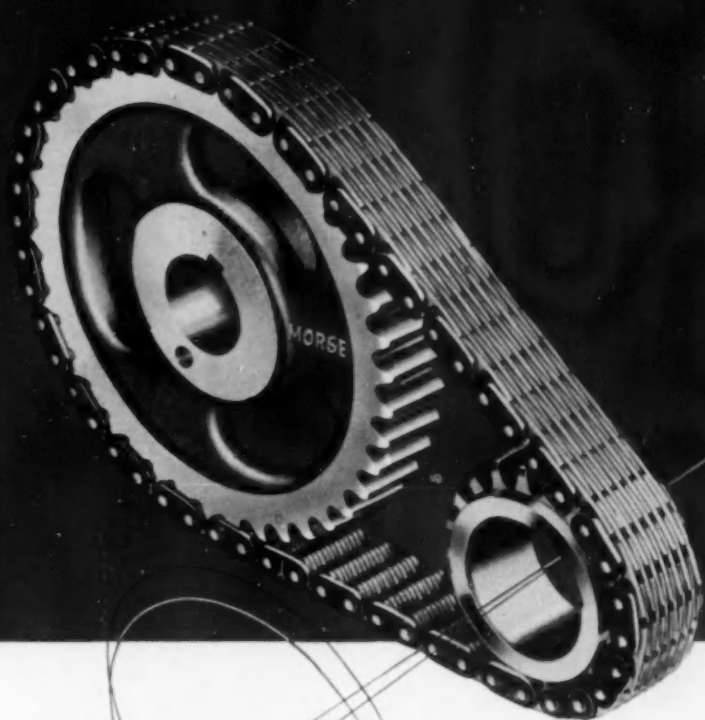
## M A C H I N E T O O L S



■ No. 2 Machine with Back Gear • 12" Overhang •  $\frac{3}{8}$ " Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.







**timing toes the mark—and so do costs**

*thanks to Borg-Warner engineering*

Ideally, both camshaft and crankshaft should be perfectly parallel for precise timing. But this calls for such close tolerances that machining to the ideal 100% would slow production, and skyrocket costs.

Morse Chain Company, a Borg-Warner unit, solved the problem long ago with Morse Timing Chain Drives. These flexible link-and-pin steel belts compensate for normal shaft end play. Even if shafts aren't 100% true, Morse Chains operate smoothly, safely, quietly—and assure accurate, trouble-free timing. Manufacturing costs toe the mark too. Morse Timing Chain Drives completely eliminate the need for extremely close tolerances, thus speed up mass production machining and assembly.

Over the years, B-W's Morse Chain has supplied the automotive industry with more than 60,000,000 timing chain drives. And today, of the 17 manufacturers using timing chains, 13 specify Morse.

Morse also "Designs it better—makes it better." It's a Borg-Warner family tradition serving the automotive industry every day.

**B-W engineering makes it work**

**B-W production makes it available**



*Almost every American automobile every day from the 193 products made by*

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THESE UNITS FORM BORG-WARNER, Executive Offices, 3105 Michigan Ave., Chicago. DIVISIONS: ATKINS SAW • BORG & BECK • CALUMET STEEL • DETROIT GEAR • FRANKLIN STEEL • HYDRALINE PRODUCTS • INGERSOLL CONDITIONED AIR • INGERSOLL KALAMAZOO • INGERSOLL PRODUCTS • INGERSOLL STEEL • LONG MANUFACTURING • MARBON CHEMICAL • MARVEL SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • NORGE • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WOOSTER DIVISION. SUBSIDIARIES: BORG-WARNER ACCEPTANCE CORP. • BORG-WARNER INTERNATIONAL • BORG-WARNER LTD. • BORG-WARNER SERVICE PARTS • LONG MFG. LTD. • MORSE CHAIN • MORSE CHAIN OF CANADA, LTD. • REFLECTAL CORP. • WARNER GEAR, LTD. • WAUSAU MFG. CO. • WESTON HYDRAULICS, LTD.

**K**ENNETH G. SMITH, author of this article, is a recognized authority on Defense Contract Renegotiation, having specialized in this field since Renegotiation was instituted by the Federal Government during World War II. At that time he served on the Army Signal Corps Renegotiation Panel and afterward became a financial and management consultant. His article, "How to Protect Yourself for Renegotiation," which was published in 1951 by AUTOMOTIVE INDUSTRIES, created wide interest in the subject among companies, trade associations and banks. With Mr. Smith as the main speaker, AUTOMOTIVE INDUSTRIES then sponsored Renegotiation conferences in 12 industrial centers which were attended by officials and key executives from several hundred manufacturers and leading commercial institutions. In this current article he analyzes the amended Renegotiation Act just passed by the Congress and signed by the President.

**W**ITH the signing of H.R. 4901 by President Eisenhower, the 1951 Renegotiation Act, as amended, has been extended until December 31, 1956. Under the circumstances, members of management would do well to re-examine their company's position with regard to defense contracts.

It is a matter of record that, regardless of any and all arguments advanced by its opponents, Renegotiation

has consistently won the support of the overwhelming majority of both political parties in Congress and of three different administrations. Its continuance for some time to come now seems reasonably certain. The case for such continuance was summarized by Representative Jere Cooper (Tennessee), Chairman of the House Ways and Means Committee.

"Although it has become possible, through better contracting and price redetermination procedures, to eliminate to some extent the uncertainty as to what eventual fair prices to the Government should be, Renegotiation is still necessary to insure that the Government is protected against unreasonable prices and gets value received on defense procurement. This is particularly true in the case of electronic and scientific military equipment, where the Defense Department must procure the very latest type of supersonic aircraft and continually make modifications during the production of such aircraft. It is also true in those many areas where there are limited sources of supply for items that are essential to our national defense.

"Our defense expenditures still represent more than half of our national budget, and renegotiation is the only means by which, due to the peculiarities of defense procurement, we can guarantee that our Government is getting the maximum return on the dollars spent on defense."

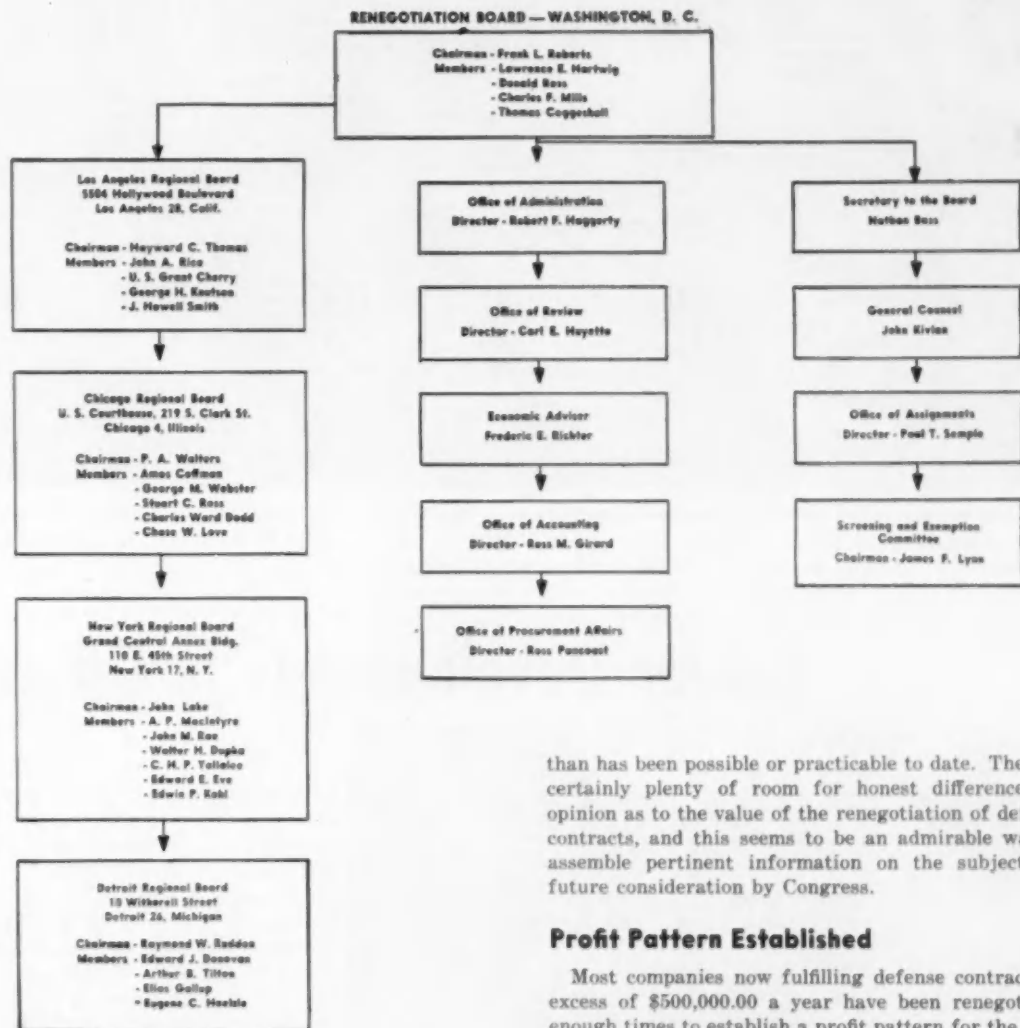
## Study of Renegotiation

An amendment to the Extension Act provides for a special study to be made of the whole subject of Renegotiation by the Joint (House-Senate) Committee on

## IMPORTANT CHANGES IN 1955 RENEGOTIATION ACT

1. Partial mandatory exemption for New Durable Productive Equipment amended to include motors and other components which become a part of an end product classified as New Durable Productive Equipment
2. Exemption for Standard Commercial Articles broadened to include Standard Commercial Services as well.
3. Mandatory exemption of construction contracts for buildings, structures, improvements and facilities, except military housing, obtained by competitive bidding.
4. Nullification of Treasury ruling which would have made Standard Commercial Articles exempted from Renegotiation subject to the profit limitations of the Vinson-Trammel Act and the Merchant Marine Act.
5. Provision for study by Joint (House-Senate) Committee on Internal Revenue Taxation of need for Renegotiation beyond December 31, 1956, the report to be made to the House and the Senate not later than May 31, 1956.

# of Amended Renegotiation Act



Internal Revenue Taxation, who will report to the House and the Senate not later than May 31, 1956. In this way Congress may be advised as to whether or not Renegotiation should be extended beyond December 31, 1956, and, if further extension appears desirable, to what extent defense contracts should be subject to Renegotiation.

A study along the lines indicated by this amendment should give the industry opponents of Renegotiation a better opportunity to present their views

than has been possible or practicable to date. There is certainly plenty of room for honest differences of opinion as to the value of the renegotiation of defense contracts, and this seems to be an admirable way to assemble pertinent information on the subject for future consideration by Congress.

## Profit Pattern Established

Most companies now fulfilling defense contracts in excess of \$500,000.00 a year have been renegotiated enough times to establish a profit pattern for the work they perform. There can be no question but that a company will have to make a very good case to get its profit percentage increased, although an increase is entirely possible where it can be justified as the result of better production, lowered costs, price reduction, etc., in accordance with the factors specified by Congress for favorable consideration.

On the other hand, it would not be wise to assume that your company's past profit percentage will not be lowered in the future. As a matter of fact there are two important reasons why the Renegotiation Board will probably scrutinize Renegotiation reports even

(Turn to page 176, please)



Fig. 1—Modification being made by optical tooling methods on a jig while it is still being used by production personnel

## Recent Developments in Optical

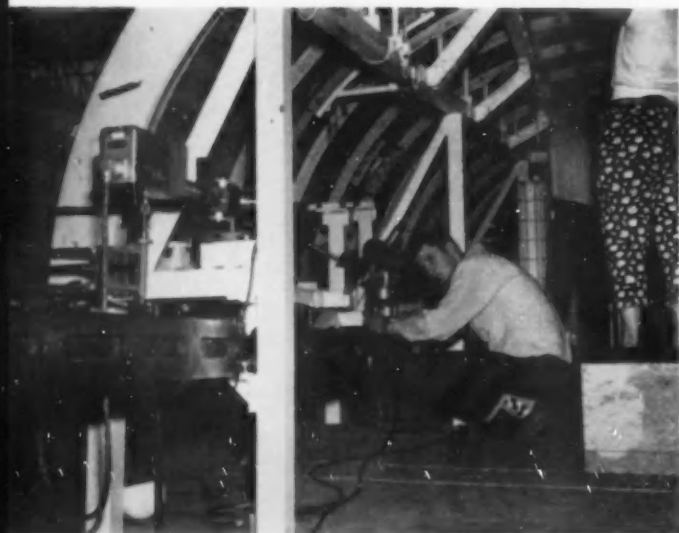


Fig. 2—Adjusting the four levelling screws and plate tangent screw of the optical square

SOON after the close of World War II the Armed Services and the aircraft companies on the West Coast held a joint meeting, the purpose of which was to obtain a cross section study of the methods used by the various aircraft companies in the designing, fabrication and periodic check of major assembly fixtures.

The Armed Services, also, were interested in developing a more accurate and quicker system of checking these tools through the use of optical instruments. It was brought out that the transit and level used by the aircraft industry at that time were classified by optical experts as third-class instruments while British instruments were considered first-class. Considerable interest was expressed by the aircraft companies and, as a result, the Air Materiel Command issued a contract to an eastern aircraft company for a study and development program on the use of these instruments. This report was published

**By K. H. Boucher**  
Chief Tool Engineer

Santa Monica Div.  
DOUGLAS AIRCRAFT  
CO., INC.

Closed Circuit  
Television Is  
Among the New  
Techniques in  
Optical Tooling  
at Convair

## Tooling . . .

under date of July 17, 1950.

Concurrent with the program sponsored by the Armed Services, much interest and individual research was being conducted by various aircraft companies, among which the Douglas Aircraft Santa Monica Division, took an active part.

The Aircraft Industries Association, through its Manufacturing Methods Committee, established an optical tooling panel to establish standards whereby an interchange of equipment could be made between aircraft companies in the event of an emergency. As a recommendation from the parent Manufacturing Methods Committee, the optical tooling panel was instructed to keep the initial standards simple and to a mini-

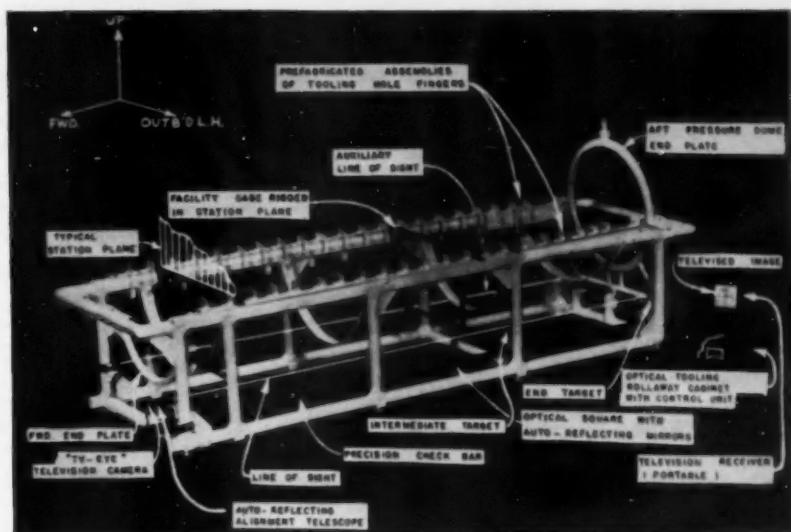


Fig. 3—DC7C aft lower half fuselage assembly jig rigged by optical tooling methods with television observer

mum, in order that continued research and development might progress in a satisfactory manner by the various aircraft companies.

In June, 1951, 12 aircraft companies, including representatives from the Eastern Region Manufacturing Methods Committee, participated in discussions on standards which had previously been agreed upon among the West Coast aircraft companies. It was decided that some recognized

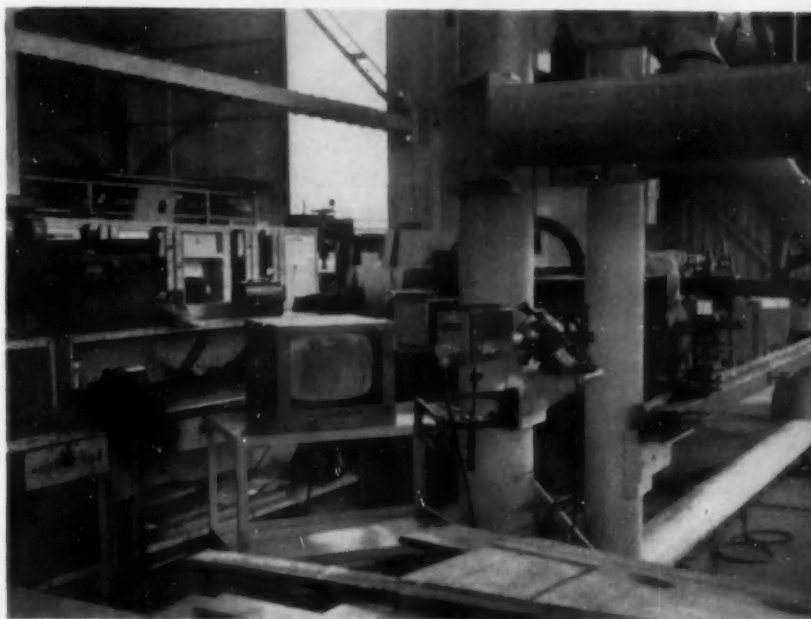


Fig. 4—This illustration shows how image appears on the television receiver



means of publishing these standards should be initiated and was agreed that the National Aircraft Standards series should be used. These standards are now recognized as standards for the manufacture of optical instruments and fixtures (NAS 900, 901, 902, 903, 904 & 906). A glossary of optical tooling terms (NAS 908) was also prepared to coordinate standard definitions and terms throughout the industry.

Although each aircraft company has developed its own methods of rigging the optical instruments onto the assembly jig structures and has designed its own holding fixtures, the basic dimensional standards have been maintained. An interchange of ideas and developments is now circulated through the tooling panel of the Manufacturing Methods Committee of the Aircraft Industries Association.

As the Douglas Aircraft Co. is engaged in the manufacturing of large aircraft as well as medium size, an optical system had to be devised to be advantageous to all. With this thought in mind, a program of optical tooling has been developed with the following

of new purchasers, new requirements of the airplane, improvements, etc. Fig. 1 shows a modification being made by optical tooling methods on a jig while it is still being used by production personnel. At Douglas the following equipment is considered to be the minimum for optically tooling a jig:

- |   |  |
|---|--|
| Micro-alignment telescopes equipped with auto-reflection light sources. | Facility gages.  |
| Targets with adapters.  | Fixed and/or adjustable mounting bases which become an integral part of the jig. |
| Spherical mounts.   | Optical tooling rollaway cabinet.  |
| Spherical mount clamps.   | Precision check bar.   |
| Spherical mount instrument brackets.                                    | Mounting base cover.   |
| Optical squares.  |  |

Each tool consists of at least one line of sight and one auxiliary line of sight. The latter serves to establish the optical reference plane through the line of sight.

A line of sight is established by means of a micro-

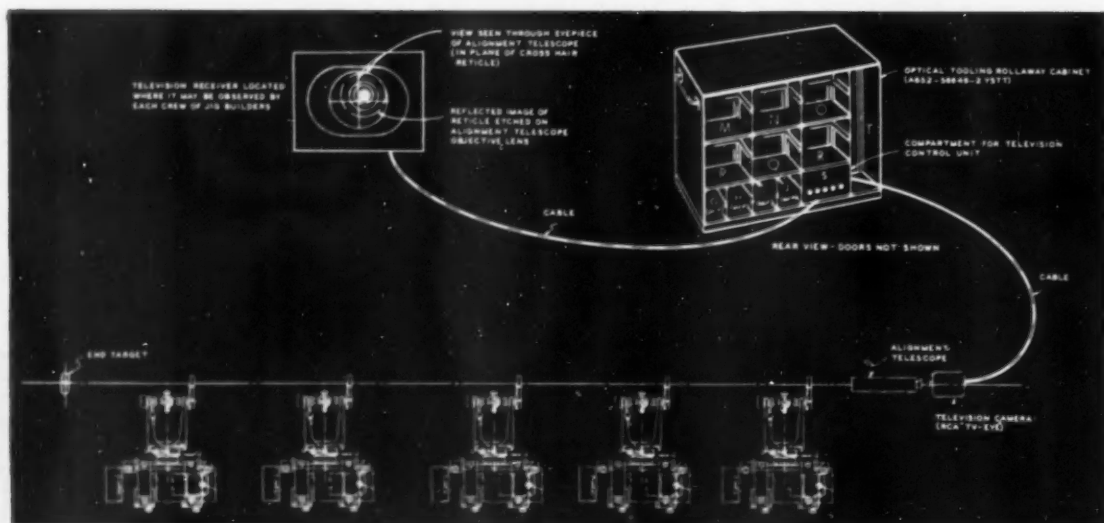


Fig. 5—A typical multiple optical square alignment problem on major jigs

results: (1) Fabrication time has been reduced. (2) Rework may be accomplished without removing the tool from the production area. (3) A clear and accessible area around the tool is not required as in the case with the level and transit method of rigging. (4) A greater degree of accuracy is attained because errors of observation are reduced to a minimum, regardless of operator's skill. (5) Rework may be accomplished without dismantling work stands adjacent to a jig.

Attention is drawn to the fact that emphasis is placed on the ability to rework a tool on the production line, not necessarily because of errors committed in the course of tool fabrication but because of modifications which are made necessary by specifications

alignment telescope and a target which are located with the appropriate accessories on the mounting bases. The auxiliary line of sight may be located dimensionally or by means of a facility gage.

After this is done, the precision check bar is rigged parallel to the line of sight within 1/16 in. in the length of a jig. This tolerance introduces only a negligible error when measuring lineally and has no effect on positioning the optical square.

The latter bars are used for two purposes: (1) They provide a means of supporting the optical square (2) Because each bar is indexed to the basic structure in only one location, the index holes in the edge of the bar, spaced 10,000 in. on center, provide a means of

(Turn to page 154, please)

# New Self-Energizing Brake Developed In France

**T**HE Brisson autodynamic brake, which will be fitted as standard equipment next year on a popular French car, features a floating primary shoe mounted between a hydraulic cylinder and an anchorage. This assembly — cylinder and anchorage — is connected to the back plate by a parallelogram in such a way that it can rotate, within limits, around the brake drum axis.

When the primary shoe is brought into contact with the drum, the unit tends to rotate and it is this rotation which controls the opening of the secondary shoe, which is also floating. However, instead of having an anchorage on the back plate, it is brought into contact with a mobile part, which transmits a part of the thrust to the linkage used for opening the shoe. The designer can very largely control the ratio between the effort of the primary shoe and that of the opening of the secondary shoe

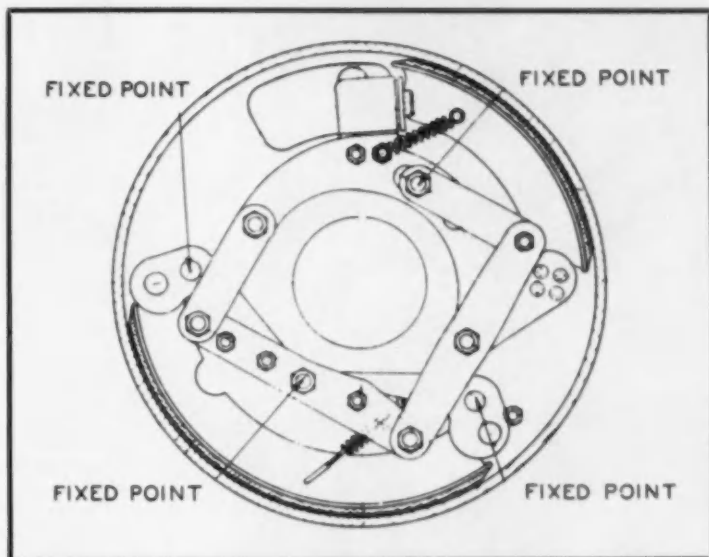


Fig. 1—Standard model of the Brisson autodynamic brake

without interfering with the length of stroke required for opening the primary shoe.

The possibility of varying the ratio between the primary shoe and the opening of the secondary shoe has made it possible to produce two versions of the Brisson brake, the standard brake being shown in Fig. 1 and the power type in Fig. 2. In this latter brake the pressure on the secondary shoe is greater than that on the primary, with the result that there is advantage in having different opening angles and different lining material. The conventional type has two equal pressure shoes, assuring equal wear of the liners and reduced warping of the brake drum. It allows of the same action in reverse as in forward running.

In the power version, intended for trucks and other heavy vehicles, shown in Fig. 2, there are two floating hydraulic cylinders and four equal-pressure floating shoes, the cylinders operating through four ratio-reducing levers on the ends of the four floating shoes. The other ends of the shoes are in contact, in pairs, with two V-levers, pivoted to the back plate. This version of the brake is intended for power application.

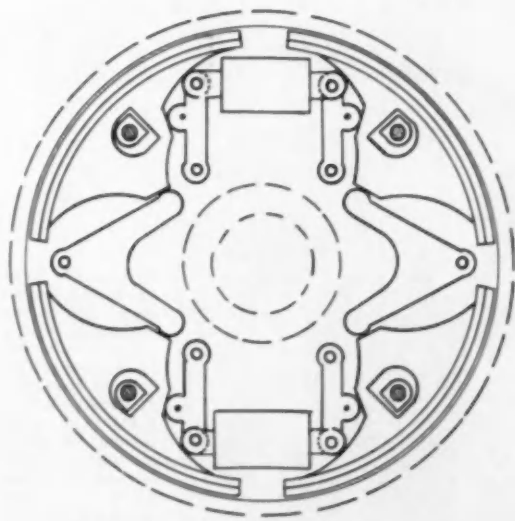
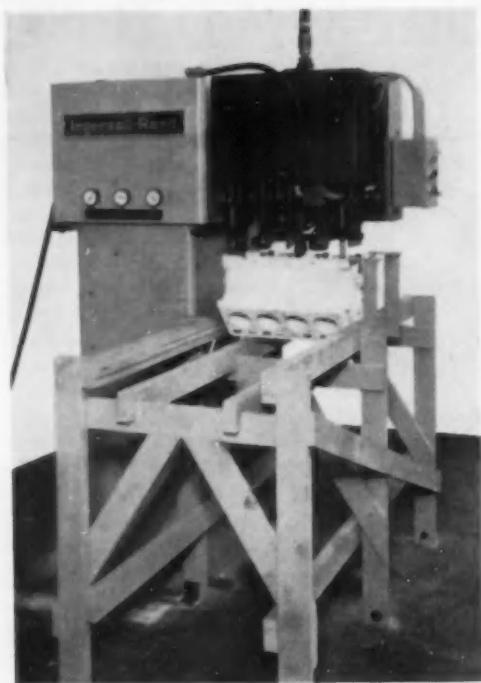


Fig. 2—Power version of the Brisson brake

## Increasing Uses



Air-operated Ingersoll-Rand automatic multiple nut runner currently in use by Ford for tightening the main bearing caps on the V-8 block prior to machining. This illustration shows the unit before it was installed on the Ford line. The wooden structure is a model of the production conveyor used with the nut runner.

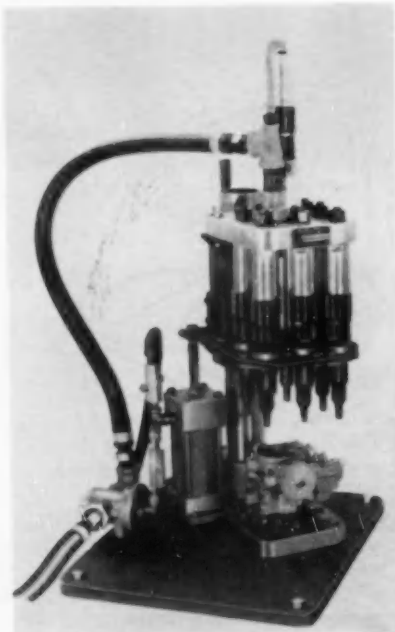
**T**HERE has been an increasing demand for both large and small air-powered multiple nut runners and screw drivers for automotive assembly work. In recent months, there have been more spindles and motors added to the large sizes and multiple units of comparatively small motor size have come into use. Of course, the determining factors relative to how many fasteners can be secured simultaneously depends on the spacing of the fasteners and their vertical or horizontal positioning.

Lately, there has been a demand for such tools with automatic controls. Multiple units with such controls are being installed on the production line as a fixed machine. One such unit is pictured herewith.

Multiple screw drivers are being used for such delicate assembly work as carburetors while the large size multiple nut runners are used for such jobs as applying 1200 lb ft on truck spring U-bolts. Multiple air-powered tools have been designed for handling up to 22 fasteners at a time. That particular job is done on an engine oil pan at the rate of 160 engines per hour.



The camshaft drive chain cover is assembled to a Packard V-8, as the engine moves along the assembly conveyor, by an I-R multiple nut runner.

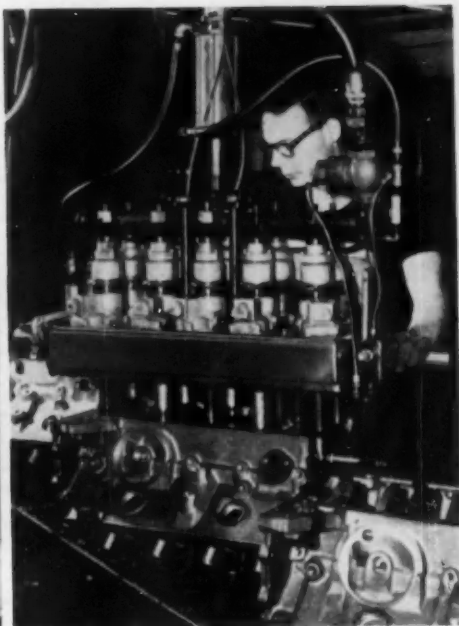
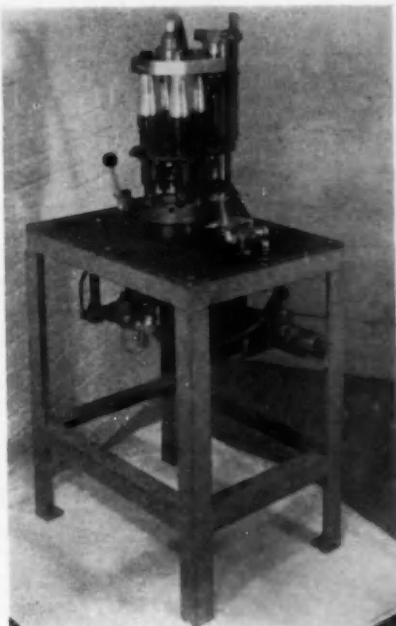


More and more small air-powered tools are being assembled into multiple units for small parts assembly. At Rochester Products Div., G.M.C., an eight spindle I-R multiple screw driver is used to assemble the carburetor air horn to the float bowl sub-assembly.

# for Air-Powered Nut Runners

Near right—This small four-motor I-R multiple screw driver assembles the cover on the Hydra-Matic pump body at Detroit Transmission Div., G.M.C.

Far right—This multiple nut runner is used on a V-8 engine to run main bearing cap screws to 85-90 lb ft after the crankshaft and main bearing inserts are in place. This job was formerly performed by three men using air powered hand tools and a fourth man torquing each cap screw. Under the present setup, one man does the job and also has time to fasten the drain cock on the side of the block with a small air powered nut runner.



## engine

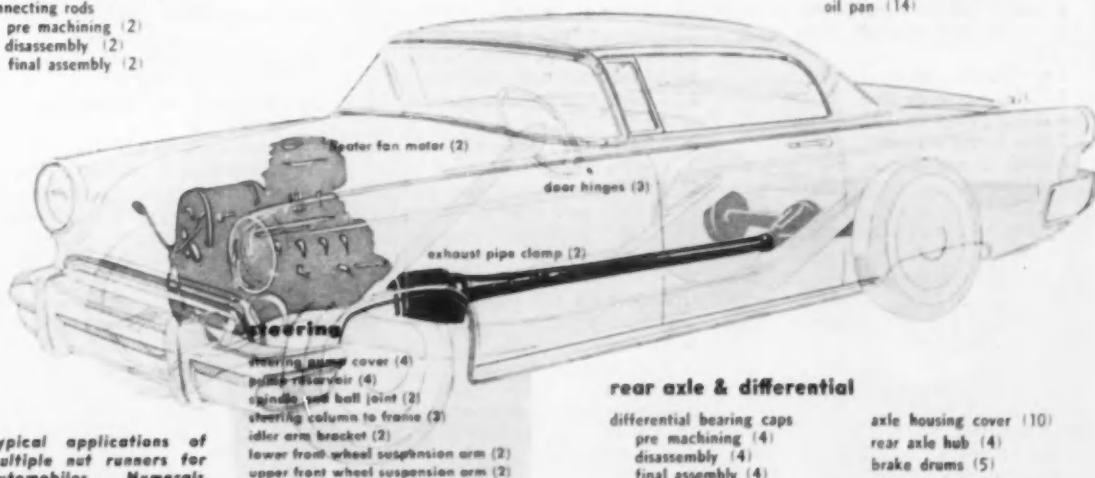
- main bearing caps
  - pre machining (10)
  - disassembly (2)
  - final assembly (10)
- oil pump
  - sub assembly (4)
  - mounting (3)
- rear main bearing seal (2)
- connecting rods
  - pre machining (2)
  - disassembly (2)
  - final assembly (2)

- oil pan (22)
- front cover (8)
- water pump cover (6)
- cam shaft thrust plate (3)
- water outlet (2)
- flywheel to crank (6)
- clutch pressure plate (6)
- cylinder heads (10)

- intake manifold (6)
- exhaust manifold (6)
- rocker arm cover (2)
- carburetor assembly (8)
- spark plugs (4)
- generator bracket (2)
- front motor support (2)
- oil filter (4)

## transmission

- impeller hub to housing (4)
- gear shift housing (9)
- transmission cam shaft lever (2)
- torque converter cover (11)
- front oil pump (4)
- rear bearing retainer (5)
- outer valve body cover (4)
- transmission to engine (4)
- oil pan (14)



Typical applications of multiple nut runners for automobiles. Numerals following part names indicate the number of fasteners driven at one time.

## rear axle & differential

- differential bearing caps
  - pre machining (4)
  - disassembly (4)
  - final assembly (4)
- carrier to differential case (10)
- differential ring gear (5)

- axle housing cover (10)
- rear axle hub (4)
- brake drums (5)
- spring U-bolts (4)
- spring shackle bolts (2)
- wheel nuts (5)

# U. S. AIRFORCE



## KEY TO DRAWING

- |   |  |   |
|---|--|---|
| 1 Radar antenna   | 20 J57 turbojet dry  | brakes, retract into fuselage   |
| 2 Radar and radio equipment                                     | 21 Compressor air bleed  | 39 Undercarriage doors (normally closed with gear down)   |
| 3 Cooling air bleedoff from main duct                           | 22 Fuselage break point  | 40 Supersonic underwing tanks (275 U. S. gallons)   |
| 4 Cooling air outlet  | 23 Fuselage break access panels  | 41 Navigation and identification lights   |
| 5 Main engine air duct  | 24 Afterburner fuel spray nozzles  | 42 Leading-edge slats (in five sections each side; carried on straight out-riggers, with secondary struts to determine angle when extended) |
| 6 Outer gun port  | 25 Afterburner variable exhaust nozzle   | 43 Thick skin over multi spars on inner half wing. Probably changing to stringers and increased number of ribs outboard                     |
| 7 Gun barrel support  | 26 Afterburner variable nozzle operating jacks   | 44 Piano hinge nose section attachment  |
| 8 M-39 20 mm cannon (two each side)                             | 27 Rear engine support   | 45 Retracting bumper  |
| 9 Ammunition tanks and gun feeds                                | 28 Braking parachute stowage   | 46 Pressure head boom (full length not shown)   |
| 10 Retracting automatic gunsight cowl                           | 29 Braking parachute cable pickup point  | 47 Control and pipe runs through spine  |
| 11 External canopy-operating buttons                            | 30 Fuel vent   | 48 Pads and access panels with engine support rig when tail is removed  |
| 12 Oxygen cylinder. Access through same panel to power controls | 31 Rudder actuator access  |   |
| 13 Cockpit pressurization control valve                         | 32 Aileron actuator  |   |
| 14 Suppressed aerials   | 33 Aileron control runs  |   |
| 15 Air outlet   | 34 Inset aileron   |   |
| 16 Access to power controls                                     | 35 All - moving tail. (Heavy - gage skin between spars, light structure nose and trailing edge sections; fin similar.) |   |
| 17 Fuel fillers, 360, 221 and 310 U. S. gallons                 | 36 Air brake   |   |
| 18 Refuelling earth point                                       | 37 Nosewheel steering motor  |   |
| 19 Fuel tank  | 38 Mainwheels, fitted with anti-skid   |   |



# SUPERSONIC FIGHTER

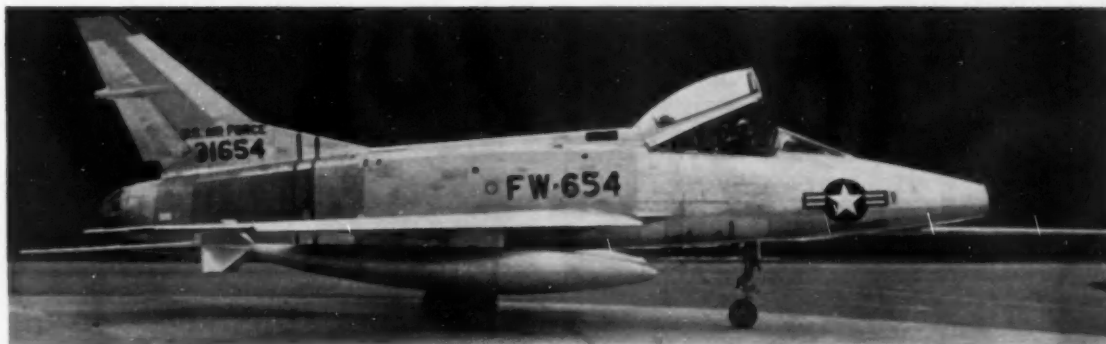
THIS drawing of the F-100A Super Sabre is reproduced by the courtesy of Flight (London)



## SPECIFICATIONS OF NORTH AMERICAN F-100A SUPER SABRE

REPRODUCED here are major design features of the F-100A Super Sabre, designed and built for the U. S. Air Force by North American Aviation, Inc. This aircraft is one of the most advanced of its type in service in the world today.

Span	36.8 ft
Length	46.2 ft
Height	13.3 ft
Net Wing Area	300 sq ft
Gross Weight	27,000 lb
Powerplant	P&W J57-P-7
Thrust Class	10,000 lb (14,500 lb with afterburner)
Max Sea Level Speed	755 mph
Max Speed	1.45 Mach No.
Service Ceiling	Over 50,000 ft
Combat Range	Over 1000 miles



This fixture is used to hold the transmission carrier during operations on the Bausch 15-station transfer machine.

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By  
**Thomas  
Mac New**

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THE demand for Ford-O-Matic transmissions has been so great that Borg-Warner has recently completed a 420,000 sq ft manufacturing plant in Decatur, Ill., to fulfill the Ford contract. Technically known as the Transmission Dept., Marvel-Schebler Products Div. of Borg-Warner, the plant has complete facilities for the machining, assembly, and test of the Ford-O-Matic transmission. It is turning out approximately 1000 of the automatic transmissions per day on a two shift basis.

Throughout this modern facility, the latest machines and other equipment are employed to achieve high production without laborious manual handling. The machining departments are equipped with a central chip disposal unit, a central coolant distribution plant, and a variety of conveyor systems are interspersed throughout the manufacturing areas. The chip handling system includes components built by Turbine Equipment Co. and a DeLaval chip extractor. Floor conveyors were built by International Conveyor and Washer Corp., while overhead installations were constructed by Jervis B. Webb and Palmer-Bee. For the production of transmissions, the plant has been divided into five basic sections—cast iron, aluminum, steel machining, heat treat and grinding, and assembly.

One of the features of the cast iron department is dust collection equipment to remove the cast iron dust, caused by machining, from the air. The department is equipped with three of the latest type transfer machines and other special machine tools for operations on the transmission case and carrier assemblies.

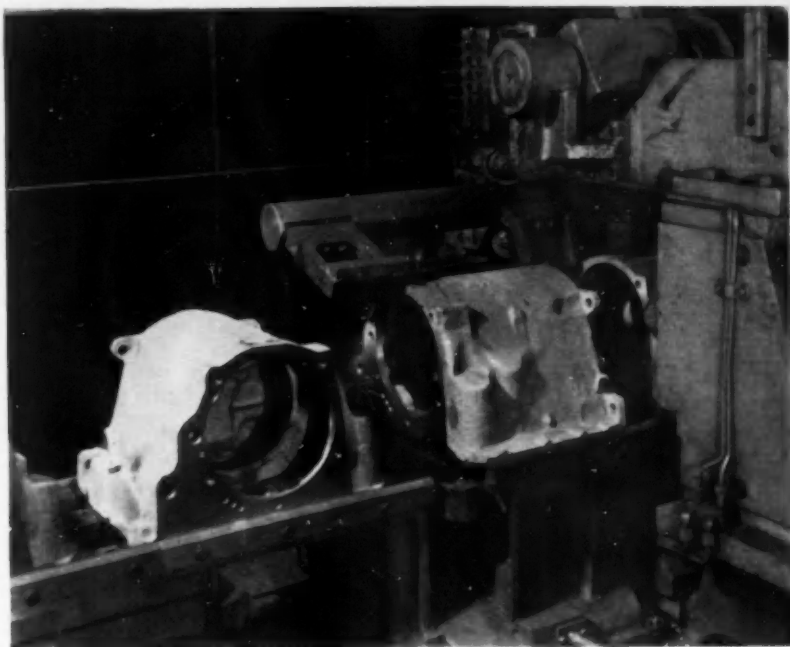
For the transmission case, the first operation is to

## Newest Equipment

relieve the stress of the cast part in a Surface Combustion annealing furnace. The next step before the cutting operations is to convey the workpiece through a Kolene molten salt bath unit used to remove scale and core sand.

Initial machining on the cast iron transmission case is performed in a double end Heald Borematic. Four of these machines with two operators are utilized for this function. After the work is clamped hydraulically, it goes through nine operations in the two-spindle machine. It is rough bored to a 5.878 in. diam and faced, counterbored to a 1.501 in. diam and chamfered on the right-hand spindle. The left-hand spindle is used to rough bore a 1.501 in. diam, rough face an adjacent inside face, rough bore a 6.254 in. diam, and rough bore and chamber a 6.378 in. diam.

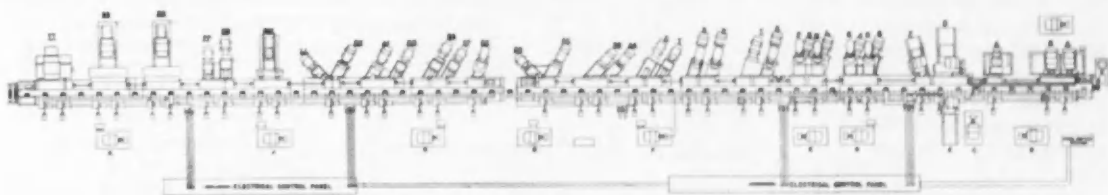
Work leaving the Heald units is then conveyed to a special Cincinnati four-station milling and drilling machine equipped with a 54-in. automatic indexing table. The first station of the machine is used to load and unload while the three remaining stations do the machining. Operations include rough milling the pan rail with a 12 in. face mill; drilling, chamfering, and finish reaming two locating holes in the pan face using a special drill setup for the drilling and chamfering—the 0.437 in. holes are reamed to 0.4382 in.; drilling a  $\frac{3}{8}$  in. hole for clearance; and finish milling the pan



At this point on the Cross 29-station Transfer-matic, the transmission case is rotated 90 deg.

**Borg - Warner's  
Recently - Com-  
pleted Plant Can  
Turn Out About  
1000 Units per  
Day**

## *for Making Ford-O-Matic Transmissions*



This drawing shows the 60 stations on the 101 ft long Cross transfer machine used on the transmission case.

face with a 12-in. milling cutter having carbide teeth.

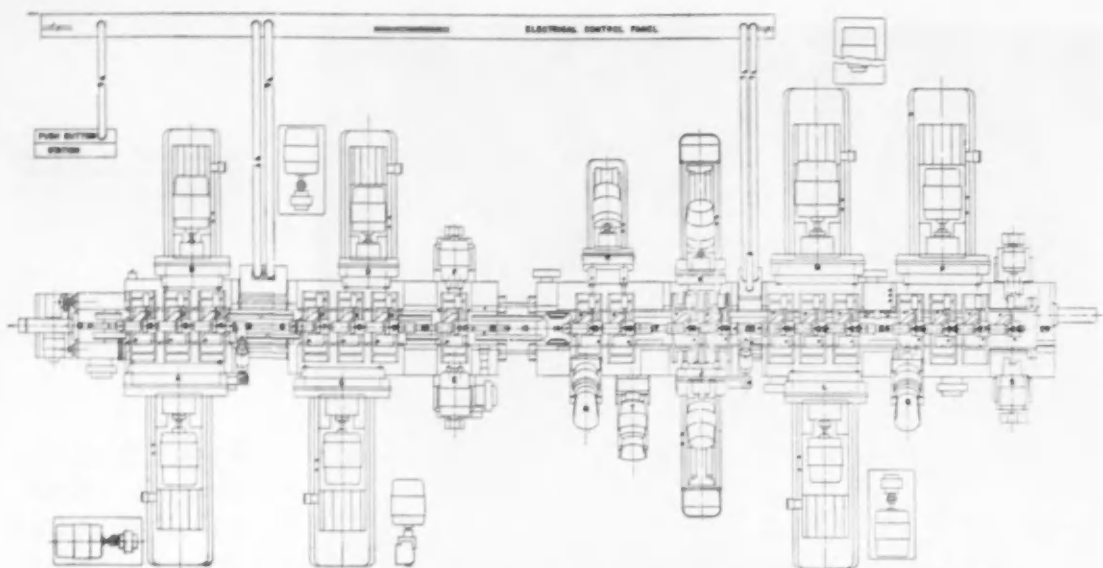
With the work next located on the pan face by means of the 0.4382 in. locating holes, the case is inserted in a Davis & Thompson eight-station Rotomatic milling machine to rough and semi-finish mill the front and rear faces. This machine is equipped with a rotary vertical drum which rotates the parts through the various machine heads.

A thorough test is then given in a VEGA single station automatic leak detection machine to detect cracks in the workpiece. This machine evacuates air from the transmission case cavity and checks vacuum

reading of each case against a standard reading.

Following the test, the edge of the pan face and the faces of two bosses are milled in a special Cincinnati ram type duplex mill. This machine is capable of turning out two transmission cases every minute.

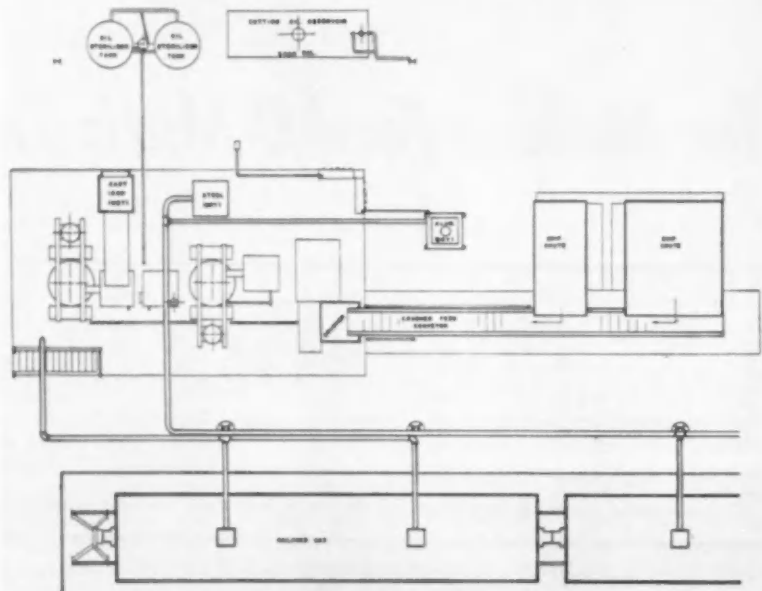
At this point in manufacture, the transmission case is loaded into one of the two Cross transfer machines on the line. The first, a 29-station machine, is used to drill, ream, chamfer, spotface, and tap the front and rear faces and dome of the case. Cross Toolometers with preset tools are used in conjunction with the machine. Production on the machine is approxi-



*Approximately 90 transmission cases per hour are produced on this Cross 29-station machine.*

mately 90 cases per hour. All cutting tools utilized in the Transfermatic are carbide with the exception of drills. During the first 13 stations, the workpiece moves through the machine laterally. At the 14th station an automatic turntable is used to move the case 90 deg so that it moves through the last 15 stations transversely — note the accompanying illustration.

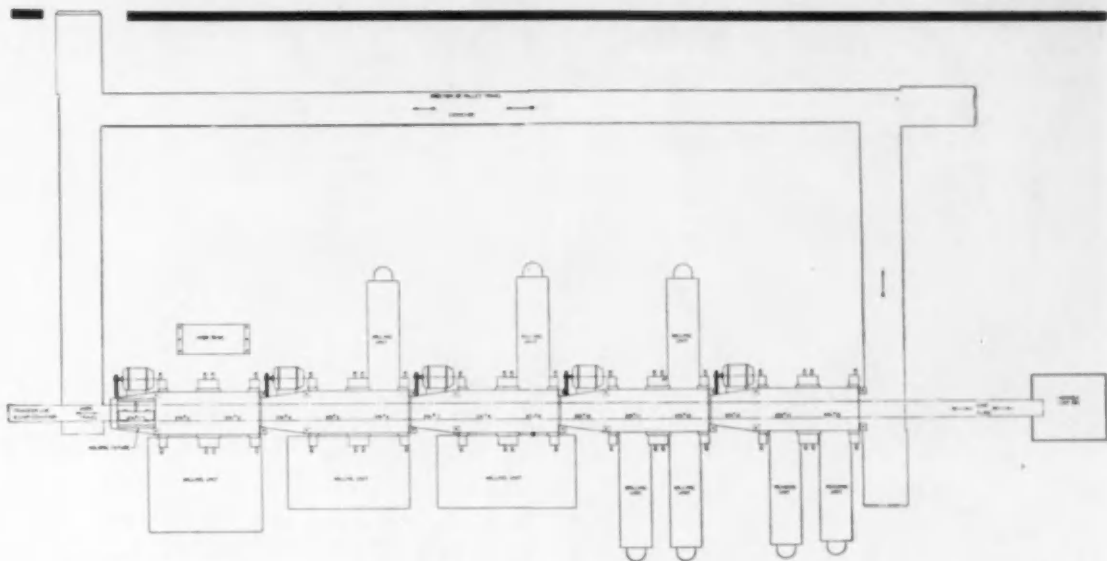
After leaving the multiple operations of the Cross machine, the case is placed in a two-spindle Kingsbury drilling machine which drills two holes in the case for the nameplate. Following this operation, the workpiece is loaded into the second Cross transfer unit, a 60-station, 101 ft long machine. Operations include milling, drilling, reaming, spotfacing, chamfering, and tapping the pan rail face. Operations are automatically inspected at various work stations. Toolometers are also used on this Cross machine to control tool changing programs. The machine has 109 tools for the various operations. A complete set of preset tools is on hand for minimum



*Equipment used in the plant's modern chip disposal system was manufactured by Turbine Equipment Co. and DeLaval.*

downtime during tool changes in the machine.

As the case leaves the Cross machine, it is washed and then located in a double-end, double-spindle, two-station Ex-Cell-O boring machine. During this phase of operations, finish boring and recessing are carried out on the 5.87-5.878 in. diam, and counterboring and finish boring are done on the 1.501 in. diam. Both of the previous metal cutting operations are performed



Major milling operations, some drilling and reaming, are carried out on this 15-station Baush transfer machine.

by the left-hand spindles, while the right-hand spindles finish bore the 6.252-6.254 in. diam, finish bore and chamfer to 6.376-6.378 in. diam, and finish face an inside boss adjacent to a bushing hole. At the next work station, which is equipped with a Denison Multi-press, burrs are reamed from a bushing hole, and the bushing is pressed in place.

A one-spindle Ex-Cell-O is then used to finish bore the bushing to size. The workpiece is next loaded in an Ex-Cell-O four-station facing machine which finish faces the bottom of the 5.876 in. bore; and also finishes the front face—both operations are carried out by the machine's upper tool block. The rear face is finished by the lower tool block. These operations are carried out with the transmission case located by the bottom hole and in the large bore. Each station of the machine completes the finish work cycle so the work does not progress through each phase for the finishing procedure.

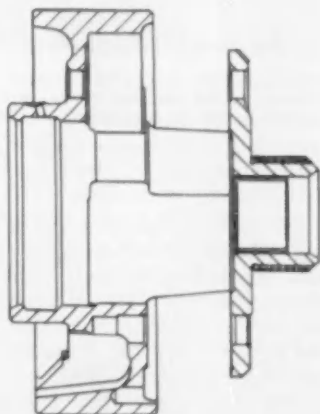
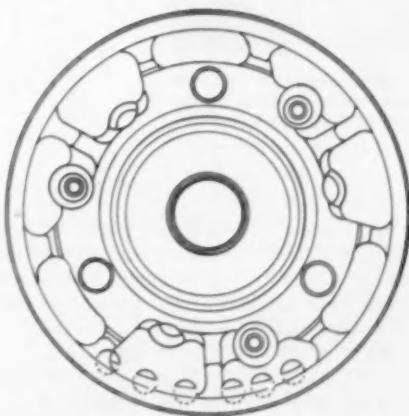
Final operations include milling the regulator mounting face, facing the valve body mounting pad, and facing the mounting boss for the rear servo on a Hoern & Dilts four-station machine. The part is then given a thorough inspection before being

passed on to the next department for assembly.

Another interesting component manufactured by the cast iron section is the rear drum or carrier of the automatic transmission. This pearlitic malleable iron part is tested for its Brinell hardness and thoroughly cleaned in a Kolene unit before it is released for machining.

A six-spindle, double-index, Bullard performs the initial operations. Carbide tools are used to rough machine the rear face true with the front half of the cage and rough turn the outside diameter. The first operation is done for subsequent locating purposes.

Using an eight-spindle Bullard for the next operation (Turn to page 114, please)

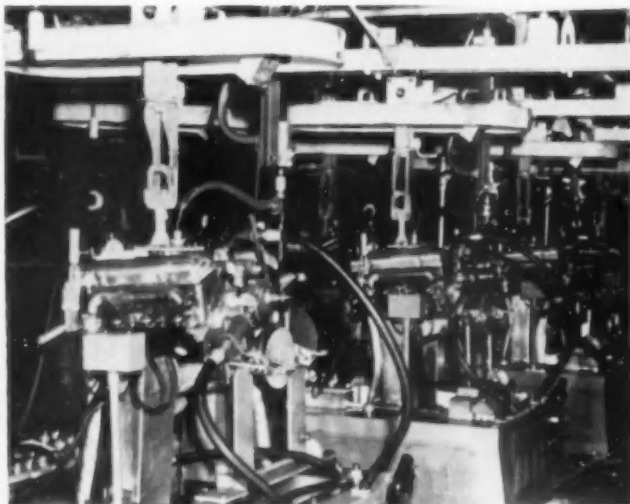


Drawing of the planetary cover rear drum assembly. This part is made of pearlitic malleable iron.





*Perspective in hot test area showing the network of Webb power-and-free conveyor lines serving it.*



*Close-up of power-and-free conveyor system which transports balanced engines to the hot test stands seen here. One of the features of the system is that engines remain on the same carrier from start to finish.*

## **DISTINCTIVE SYSTEM *of Power and***

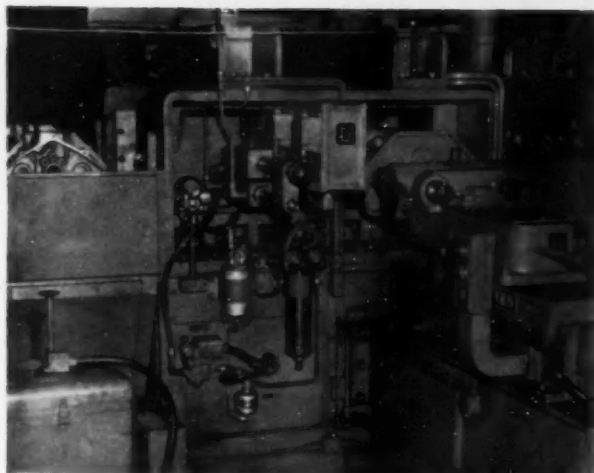
By  
**Joseph  
Geschelin**

**I**N the first part of this article we touched briefly on some of the highlights of V-8 engine production at The McKinnon Industries, Ltd., St. Catharines, Ontario, GM's Canadian subsidiary. One of the outstanding features of the operation, to be noted here, is the distinctive system of Jervis B. Webb power-and-free conveyors.

Our readers are familiar with the general character of power-and-free conveyor systems as they have been applied in a number of plants during the

past few years. At McKinnon the cycle begins directly at the last station of the engine assembly line, at which point each engine is fitted in a carrier and the carrier switch set to denote the type of engine—Chevrolet, Pontiac, or Oldsmobile. Altogether the system contains 520 of these carriers.

Functioning of the system is controlled from a master control board. Carriers leading from the assembly line proceed directly to the engine balancing station, provided with four GMR engine balancing



A special setup for automatic inspection, having a complex cycle, is this oil gallery inspection station on the Cross transfer machine. As blocks enter the unit, the ends of the galleries are plugged, then high pressure air is impressed on the oil lines. Leakage is evidenced by leak-down on the gauges shown in the front face of the station.

View along one side of the Sundstrand transfer machine on the cylinder block line. It emphasizes the arrangement of Vickers hydraulic system equipment in conformity with JIC standards. Mounted in aisle and completely away from the machines these units provide excellent accessibility for preventive maintenance.



**THIS is Part II of a Two-Part Article Devoted to The McKinnon Industries, Ltd., St. Catharines, Ontario, Canada. Part I Appeared in the July 15, 1955 Issue of AUTOMOTIVE INDUSTRIES**

## **Free Conveyors in CANADIAN ENGINE PLANT**

machines. These are similar in function to other types and makes of balancing machines described recently and are designed to give complete engine balance. Engines remain on the same carrier during the balancing operation.

At McKinnon the engine assembly line operates only one shift, providing sufficient engines for daily requirements. However, the balancing, hot-testing, and

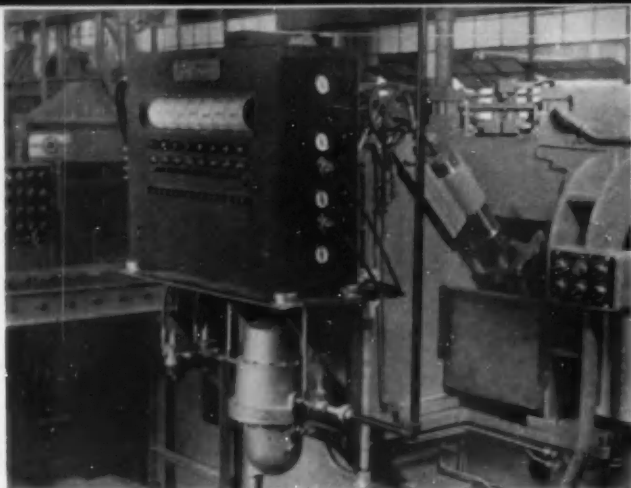
shipping requires two or three shifts to keep pace. In view of this it is necessary to store engines in the "green" as a bank for extra shift operations. That is one of the features of the conveyor system. In operation, as the line ahead of balancing is filled, the succeeding carriers are automatically routed to storage where they rest on power-free storage lines. During the course of the first shift the storage bank becomes filled and is in readiness for use later.

At the same time, the system is arranged to draw from the bank at any time if there is a shortage of engines ahead of balancing during the first shift.

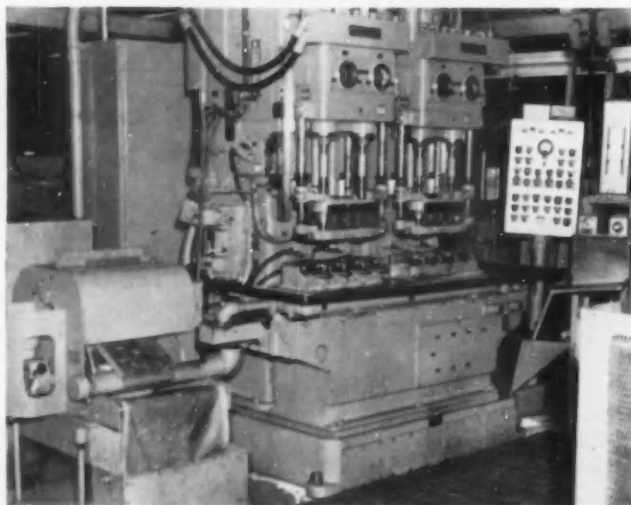
As engines are balanced and accepted, they return to the power conveyor and are transported to the hot test area. Here they remain on their carriers and are automatically switched to the proper test stand as a stand is cleared for another engine.

Following the hot test the engines proceed to the shipping area, passing through the paint spray booth along the route. In the process each engine is painted a distinctive color for identification.

Shipping arrangements are worthy of special mention. McKinnon ships engines by truck-trailers mainly to Oshawa, location of Canadian GM car assembly. To this end, engines are mounted in special structural steel pallets, three to a pallet. These, in turn, are nested securely in tiers of two or more. Pallets or carriers are stored in high tiers on the floor to conserve space, this being accomplished by means of a fleet of



Excellent example of automatic inspection is this Taft-Peirce electronic gaging machine installed as a station in the Sundstrand transfer machine on cylinder blocks. It gages bores automatically as blocks enter the station from the boring machine section.



Honing of connecting rods is done in this Barnesdrill machine, fitted with Micromatic honing head and fixtures. The Barnesdrill magnetic type filter seen at the left is used widely on other precision equipment in this plant.



Clark and Towmotor industrial lift trucks. The same trucks are used for loading the trailers at the loading dock according to schedule.

Reverting for a moment to the machine shops area described in the earlier article, it is of interest that the entire cast iron machining area is served by a comprehensive under-floor chip conveyor system. The main chip conveyor runs the entire length of the building, being fed by cross conveyors from the various machines. It terminates in a corner of the plant where the chips are stored and fed to a large briquetting machine. Here the cast iron chips are pressed into standard briquettes weighing about 11 lb each and are transported directly to the adjacent foundry for remelting.

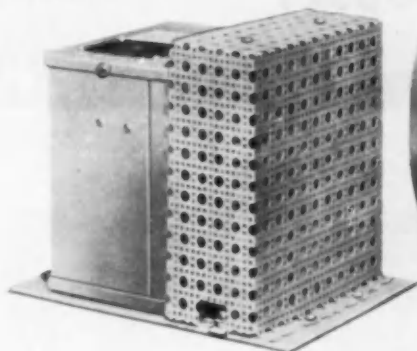
Speaking of cast iron chips, it is noteworthy that the various metal-cutting operations produce around 100 lb of chips, on the average, per engine. The briquetting machine has a maximum capacity of about three tons per hour and the system has a maximum design capacity of around 48 tons per day. At capacity engine production, however, the machine shops would produce about 30 tons of cast iron chips per day.

Some additional comment is in order as to the management of transfer machines and quality control. In the first place, although the Cross machine for cylinder blocks is self-sufficient and inherently self-inspecting, McKinnon imposes certain routine floor inspection procedures to assure conformity to specifications. On blocks, in particular, there will be found an off-line spot inspection station provided with suitable fixtures. Floor inspectors are assigned the task of removing blocks from the machine at random and checking them in the fixture to make sure that certain critical dimensions are being maintained. In addition, at certain intervals the inspectors will remove a block from the line and transport it to the inspection department for a complete checking of dimensions.

*(Turn to page 142, please)*

**This illustration shows the method employed in loading trailers for shipment of engines. As described in the text, engines are loaded in steel racks, then transported according to schedule to the loading dock as seen here.**

Star-Kimble Mo-Bil-Ac alternating-current generator and regulator.



## APPLICATIONS

### General Application

Engine-driven generator to supply electric power for mobile AC motor driven hoists, pumps, etc.

Engine-driven generator to power squirrel cage motor replacement of transmission power take-off applications

Tractor engine-driven generator for general farm use

### Specific Application & Industry

1. Electric hoists for tow trucks
2. Reel and pump motors for use on oil delivery trucks and fire fighting apparatus
3. Conveyor drives for sanitation trucks
4. Electric ladder hoists for utility and fire companies

1. Electric power for hole drillers, tail-gate hoists, portable power tools as applied to all types of road machinery

1. Electric power for squirrel cage motor drives on tractor attachments such as hay balers and choppers
2. Emergency mobile power supply for operation of lights, freezers, etc., in case of main power failure.

### Prime Mover

Engine speed variable

Engine speed variable

Engine speed variable

Engine speed variable

Engine speed variable

Gas or diesel engine, variable or constant speed

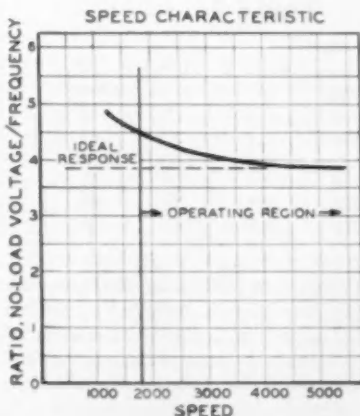
## NEW A-C SUPPLY SYSTEM

### Operates From Power Take-Off

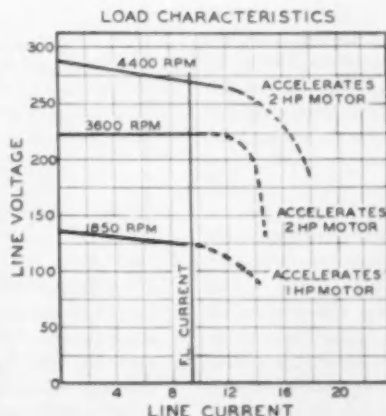
**A**n alternating current supply system for operation from a vehicle power take-off has not been readily available. This situation is being remedied with the introduction of the Mo-Bil-Ac power system, manufactured by Star-Kimble Motor Div. of Miehle Printing Press & Mfg. Co., Bloomfield, N. J. It is being made in a range of sizes. The generator and special regulator are to be introduced shortly by York Corp. as part of a mobile refrigeration system for all types of vehicles.

Successful operation over the speed range of the vehicle engine is a key feature. At relatively constant engine speed the generator will provide lighting current at 120 v line to neutral while supplying 220 v, three phase to motor loads. Speed regulation need be only  $\pm$  three per cent, for voltage regulation of better than five per cent from no load to full load at unity power factor. The system will start a motor under load when the horsepower rating approaches that of the generator.

The generator also will operate over a 4 to 1 speed (Turn to page 176, please)

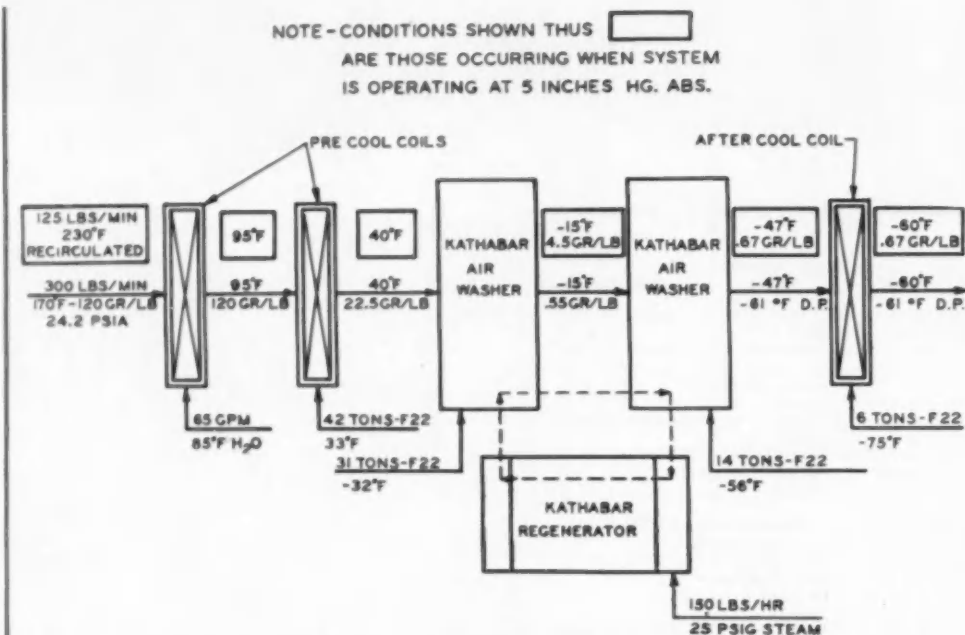


Operating characteristics of a three-kw, 3600-rpm, 220-v, 60-c three phase generator, 0.8 power factor.



# AIR DELIVERED CONTINUOUSLY

## *at Temperature of Minus 82 F*



THE South Wind Division of Stewart-Warner Corp. has recently installed in its Indianapolis facilities a cooling unit which continuously delivers air at temperatures as low as minus 82 F without frost formation, duplicate coils or cyclic operation. This is possible because this new type, low temperature air cooling system effectively combines refrigeration for sensible cooling and chemical type dehumidification for humidity control.

The general purpose of the unit is to duplicate high altitude air conditions as well as Arctic sea level air conditions. The basic plan was two-fold. First, it was to provide for high altitude testing the simulated effects of an aircraft in flight, one of which is outside ram air. Naturally, to simulate ram air at high altitudes, velocity, temperature control and humidity control were required. Secondly, since it is necessary that many of the aircraft devices produced by the South Wind Division be tested for extreme cold Arc-

TABLE I

Air Flow lb/min	Atmospheric	Recirculated	Pressure psia	Temperature F	
				Inlet	Outlet
300	—	—	24.2	170	-60
—	125	—	2.6	230	-65
—	171	—	3.1	225	-65
—	214	—	3.9	220	-65
—	259	—	4.9	220	-65
—	270	—	5.5	215	-65

tic starting conditions and operating performance, this cold air supply was also so designed to deliver various air conditions to the sea level test circumstances. The basic design air requirements for the cooling unit are given in Table I.

A number of continuous defrosting systems to meet the preceding design requirements were investigated. A Kathabar lithium chloride spray system was



## for Testing Aircraft Devices

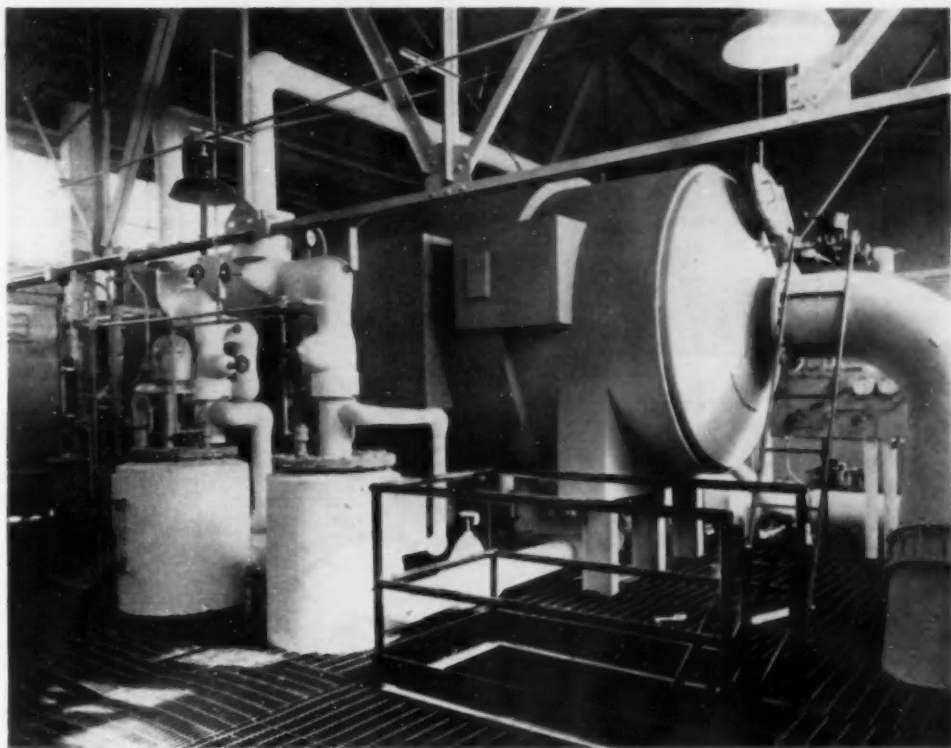


FIG. 2—Cooling system installation showing the pressure-vacuum tank in the background, three Kathabar pumps in the left foreground and the Kathabar regenerator in the left background.

ultimately chosen as being best suited to meet the stringent requirements. A flow diagram of the Kathabar cooling system as installed is given in Fig. 1. The various operating conditions included on this flow diagram are those for the delivery of 300 lb per minute of ram air at minus 60 F and 24.2 psia pressure for high altitude testing. In the first stage the air temperature is reduced to 95 F with 85 F cooling tower water. The second stage cools and dehumidifies the air to 40 F and 22.5 grains per lb through the use of Freon 22 at 33 F. The third stage or first Kathabar air washer further reduces this air to minus 15 F and 0.55 grains per lb with Freon 22 at minus 32 F. The second Kathabar air washer, using Freon 22 at minus 56 F, delivers the air at minus 47 F and a dewpoint of - 61 F. The fifth stage cooling coil then cools the air down to the desired exit temperature of minus 60 F

by means of Freon 22 which is held at minus 75 F.

Because the air in this system was to be conditioned and delivered while under pressure or vacuum, the entire system was enclosed in a tank, Fig. 2. The three pumps in the left foreground of Fig. 2 service the Kathabar regenerator and stages 3 and 4 respectively from left to right. In the left rear of that same illustration can be seen the single Kathabar regenerator which serves the two air washers enclosed in the tank.

The density change from 45 in. abs to 5.0 in. Hg abs causes large velocity changes. Actual operation has been possible on this basis without carry-over of lithium chloride and with the dewpoint maintained at -80 F.

A cutaway drawing of the pressure tank together with the air flow pattern through it are shown

FIG. 2—Schematic drawing of the pressure tank which encloses the cooling coils and Kathabar air washer units combined in this system. The arrows indicate the air flow pattern through the tank. Components are identified as follows:

- 1—First stage cooling coils
- 2—Second stage cooling coil
- 3—First stage Kathabar unit
- 4—Berl saddle diffusers
- 5—Berl saddle eliminators
- 6—Second stage Kathabar air washer
- 7—Fifth stage cooling coil

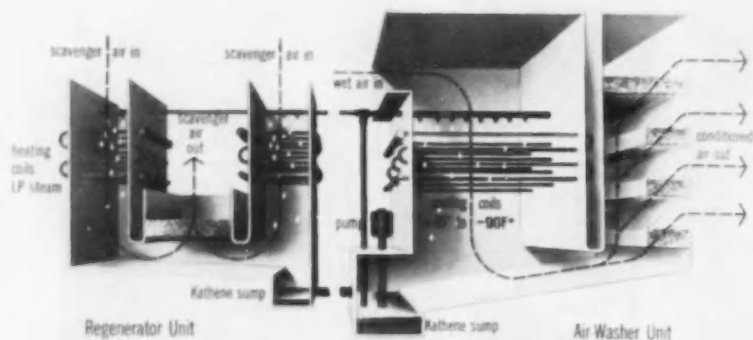
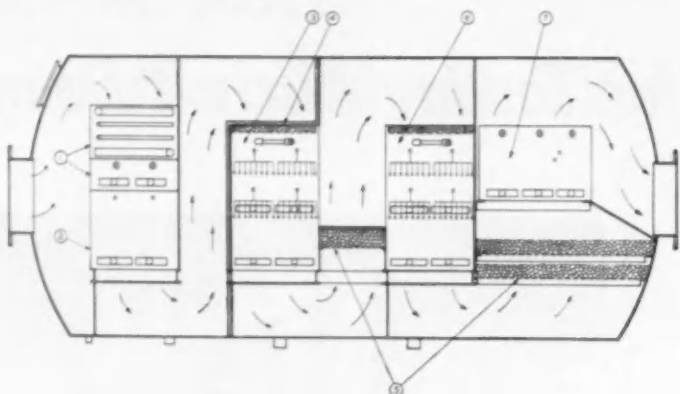


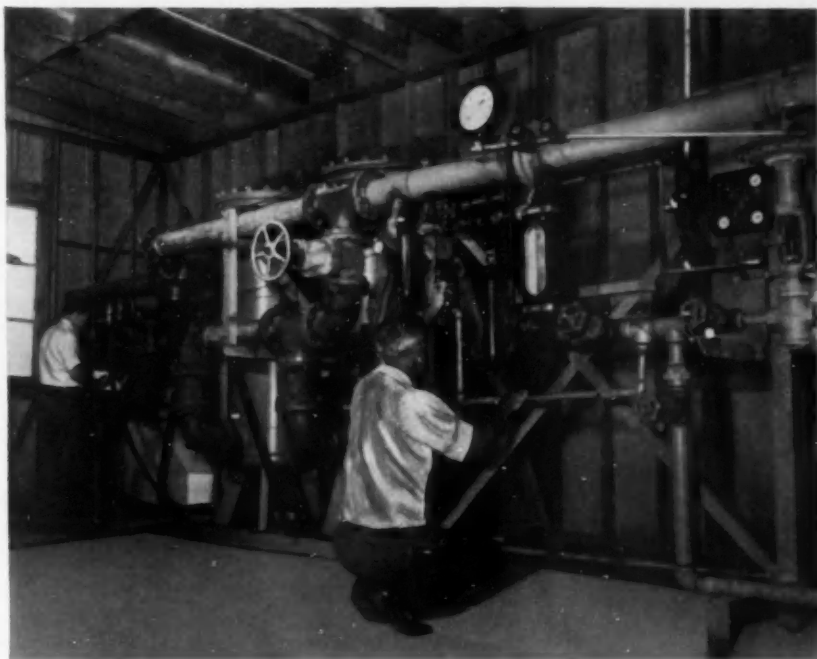
FIG. 4—Schematic diagram of a typical Kathabar air washer and regenerator combination, showing the major elements of their respective cycles.

Fig. 3. Components are also identified in the figure.

Shown schematically in Fig. 4 is a typical Kathabar air washer and regenerator combination. In the Stewart-Warner system two air washers, both enclosed in a pressure tank, are used with one regenerator. As shown in the illustration, the humid air enters the top of the air washer unit and as it passes down through this first contactor section it comes in intimate contact with the lithium chloride solution as both pass over extended surface cooling coils. The lithium chloride solution used in the Kathabar systems has a great affinity for water. The higher its concentration or the lower its temperature the more moisture it can absorb from a contacting air stream. In Kathabar operation the lithium chloride solution is usually maintained at a constant density and its temperature varied by using coolants of various temperatures and flow rates. Thus, in the Stewart-Warner system the coolant in the Kathabar air washer coils, both serve to cool the air stream and also the absorbent solution, thus establishing the

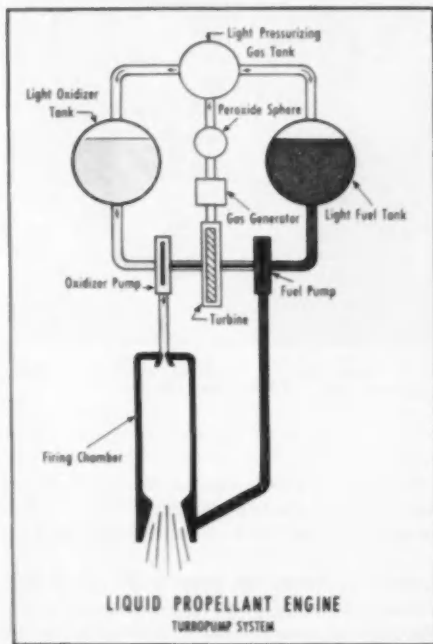
amount of dehumidification which is to be performed.

In the air washer unit after the dehumidification or air drying pass, the air itself passes on out of the unit while the absorbent solution, called Kathene solution, falls into a sump. From this sump it is continually being recirculated back to the flooding nozzles in this the contactor section. A small portion of this solution, about 10 to 15 percent, is also continually being circulated to similar, though smaller, spray chambers in the Kathabar regenerator unit. When the solution density or concentration falls below a certain point in the air washer sump, a motorized valve is opened directing low pressure steam to the coils in the regenerator unit. Thus, the solution being sprayed over these coils is heated, forcing it to give up the absorbed moisture obtained in the air washer unit. A scavenger air stream then entrains this released moisture purging it to the outside. The re-concentrated solution, after falling into the regenerator sump, drains back to the sump of the air washer unit. There is no loss of solution in this system.



**LEFT** — Engineers chart each rocket engine's future performance by "firing" them with water, simulating fuel. Two tons a minute are gushed through while flow rates and pressures are measured, then converted to actual performance data.

**BELOW**—Basic elements of a bi-propellant rocket engine are shown in the sketch by Reaction Motors, Inc. Fuel and oxidizer, stored separately, are forced into combustion chamber by pumps driven by turbine. Steam, from decomposed hydrogen peroxide, drives turbine. Fuel or oxidizer may be used to cool chamber. Although more complex than simple stored-gas type, turbopump system develops most power for its weight.



## Non-Destructive Rocket Testing

**U**NLIKE other engines, which can be test run to determine their behavior, rocket engines are one-shot affairs. Once fired, they are consumed. To learn exactly how each engine will behave, in advance, Ryan Aeronautical Co. tests them with water. Several tons of water per minute are gushed through the engine. The water is filtered so that it contains no particles larger than 0.00025 in. Pressures, volumes and rates of flow are carefully measured. One of the test setups is illustrated here.

These data are translated into actual fuel values by conversion factors which adjust for the differences in viscosities, temperatures and other variables between the water and fuels used. The engineers then develop hydraulic characteristic curves which precisely chart the future performance of each rocket engine.

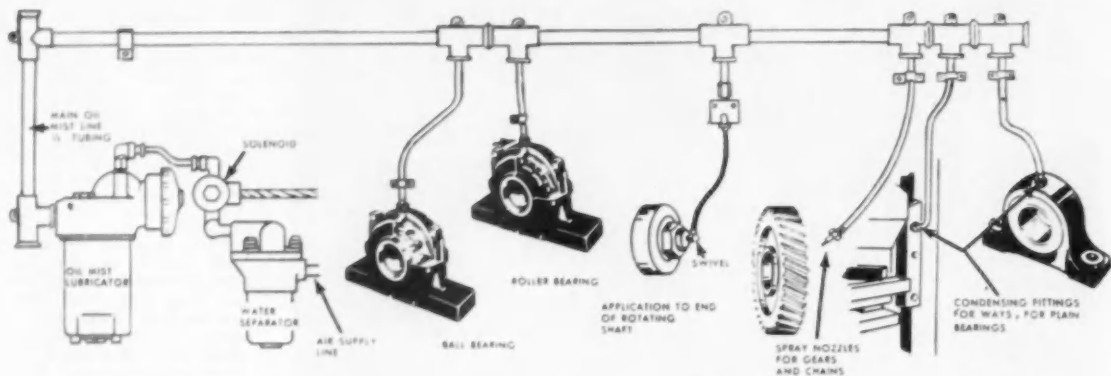
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### \$20,000 in Scholarships To Be Awarded By ASM

Metallurgy scholarships totalling nearly \$20,000 will be awarded to 49 leading engineering schools by the American Society for Metals. This marks the third consecutive year the scholarships will be given out by ASM as part of its program to stimulate greater interest in metallurgy. Each scholarship is worth \$400.

By  
Thomas Mac New

## Centralized Lubrication



Schematic illustration of the Oil-Mist type of automatic centralized lubrication showing the three types of orifices and the manner used.

**M**AINTENANCE lubrication costs have been slashed by as much as 50 per cent at the Lycoming Div. of Avco Stratford, Conn., by the use of centralized lubrication on its machine tools. Some 3200 machines in the plant are utilized for the production of reciprocating, turbojet, and turbo-prop aircraft engine parts.

For the most part, machines used in the plant are not new and have previously undergone repairs. Now, whenever a machine is down for overhaul, the maintenance department installs the centralized lubrication equipment. With this program Lycoming has installed in recent months Stewart-Warner Ale-mite systems on some 800 of its machine tools.

There are two types of systems generally used throughout the plant. One is the Oil-Mist system on approximately 660 machines and the other is the Stewart-Warner Accumeter, primarily for grease, on some 140 machines.

Not only have savings been achieved through central lubrication, but the systems have also been used for cooling and cutting fluids. Due to the program, tool life has shown great improvement and cutting oil consumption has been reduced per unit of production.

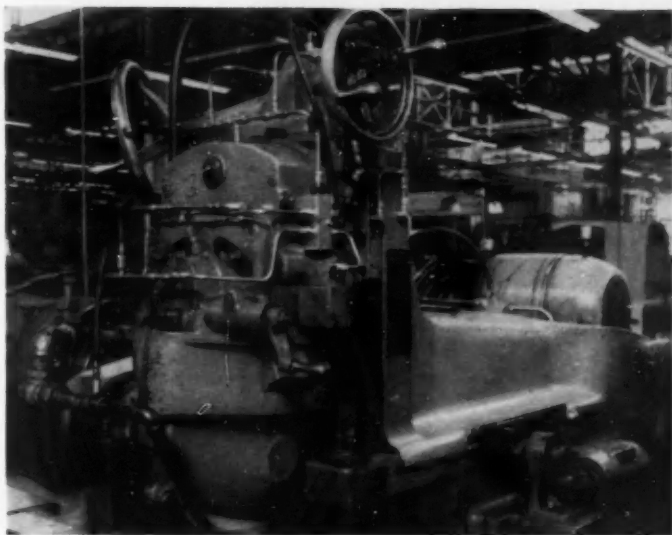


Back view of a few of the 16 Snyder milling machines which have been completely equipped with Oil-Mist lubricators.

The positive form of machine lubrication made it possible for Lycoming to shift eight of its 29 oilers to much more vital positions on the engine production line.

On the Oil-Mist units, the amount of oil is controlled by the type of orifice—mist, condensing, or spray. The system operates with air pressure at

# in Aircraft Engine Plant Conserves MACHINES, OIL and GREASE



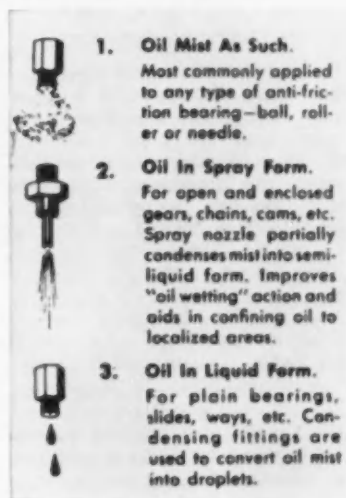
The various tubes shown around the machine were used in the installation of an Oil-Mist system on the Pratt & Whitney gear grinder.

between six and 10 psi but often runs as high as 16 psi. As long as there is proper ventilation around the machine, there has been no problem of fogging. When used on bearings, the orifice utilized should be carefully chosen, depending on the type of bearing involved. Lycoming reports that it has not experienced any difficulty of the mist blowing by or escaping through bearing seals.

In the air line of the system a water separator is used to prevent any foreign matter from clogging the orifice or getting on the lubricated surface. An interlock switch in the air line automatically cuts the machine motors in case of air failure.

For automatic operation of the Oil-Mist system, air passes through a solenoid valve to an air regulator valve and strainer to provide desired pressure. The air then passes through a venturi which also receives the lubricating oil. In the venturi the oil is atomized by the air flow and is forced against a baffle which collects the larger oil particles. These particles are returned to the reservoir while the remaining air, saturated with minute oil particles, is sent into the main lubrication tube. A number of branch tubes are used off each main line. This method not only lubricates but cools the running parts. The amount of oil used by the system depends on the oil flow control setting and air pressure. Minneapolis-Honeywell controls are used for the automatic operation of the system.

The Accumeter system is not automatic in operation, although centralized. It is used by Lycoming primarily for grease fittings. With this unit the grease is put in a container with a hand operated plunger attached. Branch lines to the fittings are installed from the



Types of fittings used with the Alemite system and how they deliver oil.

pump assembly. Once each day the machine operator applies one or two shots of grease to each machine by means of the central grease supply.

When setting up a centralized lubrication program, it is necessary to survey the equipment for the type and size of gears and bearings, the minimum and maximum speeds at which the machinery will be run, and the thread size of the lubricant inlet. Bearing areas should be ascertained in order to determine the number of lubricating units to be utilized on the equipment. (cont'd)



Some of the equipment in the plant using Oil-Mist lubrication include Heald grinders, Pratt & Whitney gear grinders, Lees-Bradner thread cutters, Cincinnati mills, Snyder mills, Norton grinders, Natco horizontal drills, Cincinnati Hydrotel mill, and Fellows gear shapers. The other system is used on Bullard Multi-Matics, Footburt drills, Natco drills, Edlund drill presses, Arter grinders, Baker drills, a variety of tumbling barrels, and much other equipment.

• • •

### **Lunn Laminates Broadens Its Overseas Activities**

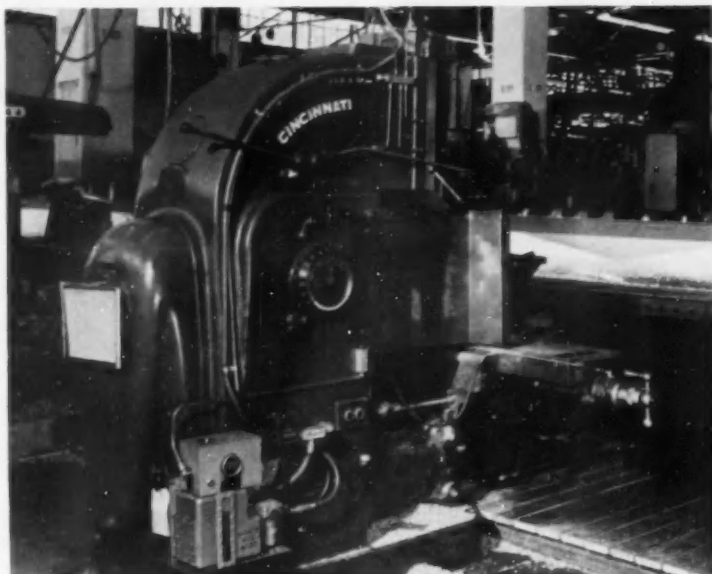
Omni Products Corp. of New York City, which has offices in a dozen countries, has been appointed an exclusive agent for Lunn Laminates, Inc. This is another step in the company's current expansion program which broadens its operations into Australia, New Zealand, and Europe.

In Australia, the new agent has concluded negotiations between Lunn and Freighters, Ltd., of Melbourne. Freighters-Lunn Industries, Ltd., is name of new corporation formed through this association.

The first step now underway in this joint program is the large-scale production of reinforced plastic automotive parts at a plant being completed in Adelaide, South Australia. It is expected that the first body parts will be completed within six months.

In New Zealand and Europe, Omni has completed arrangements with Tiescher Brothers Co., Zurich, Switzerland, and Modern Plastics, Ltd., New Zealand, for a program described as "know-how" agreements. Technical representatives of the two overseas firms have concluded extensive studies in reinforced plastic methods at the Lunn plant and now are in process of establishing reinforced plastic production facilities adjacent to their present factories.

Under terms of the agreement, the plants in New Zealand and Switzerland will receive technical assistance from Lunn for a period of ten years. Omni Products Corp. currently is completing similar arrangements with a number of other foreign companies.



Installation of the Oil-Mist system on a Cincinnati milling machine. Note the lubricator in the left foreground.



An Oil-Mist coolant setup is used in conjunction with a Cincinnati Hydrotel at the Avco Lycoming plant.

### **Hupp, Perfection Stockholders To Vote on Merger This Month**

Shareholders of Hupp Corp. and Perfection Industries, Inc., will vote Aug. 29 on whether to merge the two companies. Under the plan, approved by directors last month, Hupp preferred and common stock would be issued in exchange for Perfection

Industries Corp. common shares.

If the merger is approved, Perfection would become a division of Hupp, which has plants in Detroit and Chicago. Perfection has three plants—two in Cleveland and a new unit it is establishing in Waynesboro, Ga. The two companies had combined sales of \$34 million last year and assets exceeding \$27 million.

# Report to Cylinder Users . . .

Here at Miller Fluid Power we have a pattern which we follow. A goal at which we are shooting. The pattern isn't too simple. And the goal isn't an easy one. But we've been making progress. Our position right up in the van of the industry proves that.

Our job is the production of cylinders. Basically, there's nothing anyone can do to alter a cylinder. It was old a hundred years ago. It probably won't change basically in another hundred years. But in the details of the cylinder, change is the major element.

Which is very much like industry itself. Basically industry has not changed since free enterprise was conceived on this continent. But in every detail it changes from year to year.

## **It's the Thousandths That Count**

There was no single big thing wrong with the cylinders being manufactured yesterday. Just a lot of little things. So Miller Fluid Power made the improvement of little things its business.

We experimented with new materials and made safer, more dependable steel heads and caps. We hard-chrome-plated 110,000 PSI yield point steel to improve radically the piston rods. We raised the efficiency of operation to new peaks. Striving for quality in the smallest detail we improved in a dozen parts which are hidden from sight.

For instance, most cylinders leaked in operation. Miller made one that wouldn't leak. To prove it, we went away out on a limb and guaranteed leak-proof operation. And made the guarantee stand up.

## **We Learn by Listening to You**

We saw our customers as thousands of men in thousands of shops wrestling with thousands of production problems. We made those problems ours and produced cylinders to whip those problems. Maybe we didn't revolutionize the cylinder business in the process. But we sure helped. We know that.

We learned to produce what we believed was the best cylinder on earth. We also learned that the best cylinder today wouldn't be good enough tomorrow. So, with the good one in production, we listened some more, experimented, and came up with a better one.

Miller Fluid Power is a young company in an old field. We are young, progressive, and willing to listen. We innovate without being prodded.

## **Discussion is a Two Way Street**

On occasion we like to have others listen to us. Especially when what we have to say will help our customers. That is the idea behind our College of Cylinder Knowledge. We know a lot about cylinders. Though not as much today as we will tomorrow or the day after.

In our College of Cylinder Knowledge we try to show you what good cylinders can do for you. And what you should demand in any cylinder you buy. We meet other men who know what they want in a cylinder. We listen to their wants and try to explain what perfection in detail means.

We believe that when the users of cylinders sit down across the table from the producer who is trying to make the best, better cylinders result.

We'll be carrying that belief into the Production Engineering Show at Navy Pier in Chicago on September 6. Our College of Cylinder Knowledge booth will be open for that kind of discussion. We'll listen and learn.

The only way we can learn is from you. We can help you. But not until you've dropped that problem of yours in our lap. Your problem contains the stuff of which the better cylinder will be made. The cylinder that will have that quality plus which we like to think is the stamp of Miller Fluid Power.

Remember this when you see the sign over Booth 1819-23. We'll be there to listen to your suggestions, demands and questions. Also, because we are in the cylinder business, we'll be there to show you a cylinder you will want to buy.

Visit Miller  
**BOOTH #1819-1823**

**Production Engineering**

**NAVY PIER SHOW CHICAGO**

*Frank Flick*  
President

**MILLER FLUID POWER COMPANY**

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# MODERNIZATION ... in ACTION!

## PRATT & WHITNEY

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Velvetrace Milling Machine  
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48" Vertical Rotary Table  
24" Plain Optical Rotary Table  
42" Plain Rotary Table with Automatic Positioning  
Potter & Johnston Automatic Turret Lathes  
Sigmatic Gaging Machines  
"Automation" Gages and Feed Back Controls

**ALSO** Model "C" Toolroom Lathe  
Vertical Die and Surface Grinder  
Universal Die Sinker  
Electrolimit Jig Boreers  
End Measure Type Jig Borer  
Kellerflex Machines and Burs  
Pneumatic Grinding Head  
Plain, Tilting and Vertical Rotary Tables  
Comprehensive Display of Precision Cutting Tools  
Comprehensive Display of Standard Gages and Comparators

## PRATT & WHITNEY

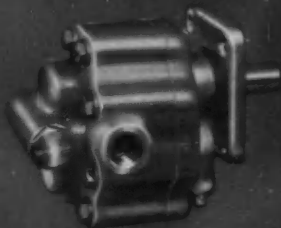
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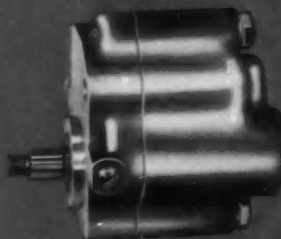


MACHINE TOOLS • CUTTING TOOLS • GAGES  
1860

Hydraulic Power by Pesco . . . Lift Truck by Yale



Model GS 1675-810 Pesco Hydraulic Motor operates special handling attachments available on Yale trucks. Compact and precision-built, this gear motor has a starting torque efficiency over 90%.



Hydraulic power for operating lift and tilt cylinders on new Yale trucks is supplied by Model GS 1601-200 Pesco Hydraulic Pump.



## PESCO PUMP GIVES YALE A BIG LIFT

Yale's new G52 Series 2000-pound capacity, cushion-tired industrial gas trucks get their big, powerful lifting action from a small, compact Pesco® Hydraulic Pump. Assuring completely dependable hydraulic power, this pump provides the untiring muscles for raising heavy work loads safely and smoothly.

Users of this truck are assured of longer service life and sustained new pump performance by the pump's "Pressure Loaded"® bearings which automatically adjust for wear. This patented Pesco principle also maintains constant performance characteristics regardless of operating temperature, oil viscosity or load conditions.

Attachments for the Yale G52 trucks are operated by a positive displacement Pesco Hydraulic Motor. It efficiently converts hydraulic power into mechanical motion for actuating revolving clamps, rotating forks and other accessories.

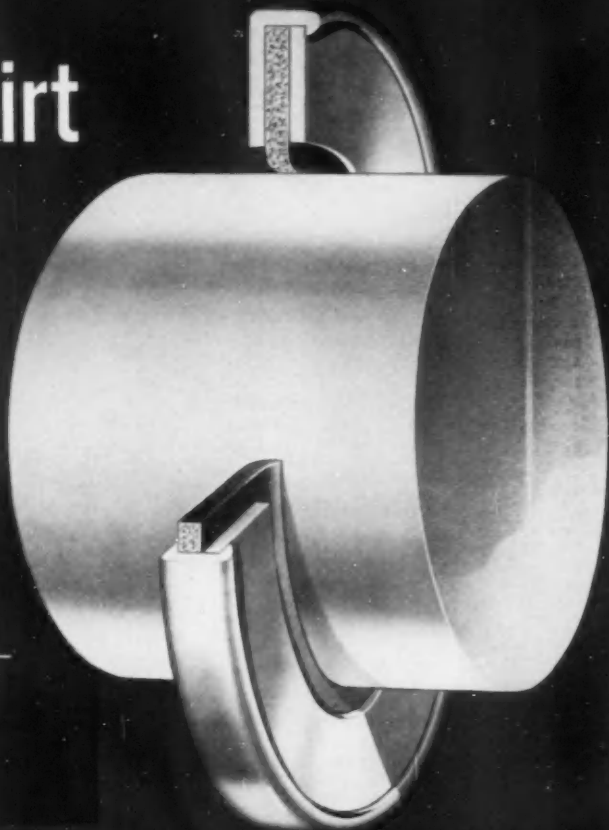
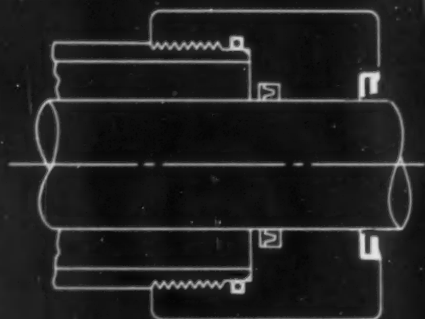
If you are interested in unfailing hydraulic power for your products, follow Yale's example and come to Pesco. Here you will find an experienced engineering and production organization ready to help solve your electro-hydraulic problems. Call or write: PESCO, 24700 North Miles Road, Bedford, Ohio.

*\*Pesco's patented principle of gear pump construction.*



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Hydraulic cylinder makers use Chicago Rawhide's Type G wiper seals for many reasons. Here's one: the special Sirvis leather wiper element holds its own lubricant—operates at low friction. This means negligible power loss. Another advantage: the Sirvis leather element will not trap grit and carry it—will not score the shaft. Years of dependable performance have demonstrated the ability of C/R Type G Oil Seals to exclude dirt, dust and moisture. They may be the answer to your problem, too. Write for your copy of "C/R Perfect Oil Seals."



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*More automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device*

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# EATON Free-Valves LAST LONGER\*

## Free Floating Action—

- Wipes stem and seat free of deposits
- Keeps a film of oil on stem and guide surfaces
- Prevents scuffing
- Prevents burning and guttering
- Reduces wear
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Performance records covering engines of all types in all kinds of service prove that Eaton Free-Valves increase valve life many times over the ordinary life expectancy of conventional valves.

Eaton Free-Valves can be applied to engines of all types and sizes, without costly design changes. Our engineers will be glad to discuss Eaton Free-Valves with you.



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# No stoop, no squat, no oil can to lubricate 24 bearing surfaces on this connecting rod balancer

FARVAL—  
*Studies in  
Centralized  
Lubrication*  
No. 177

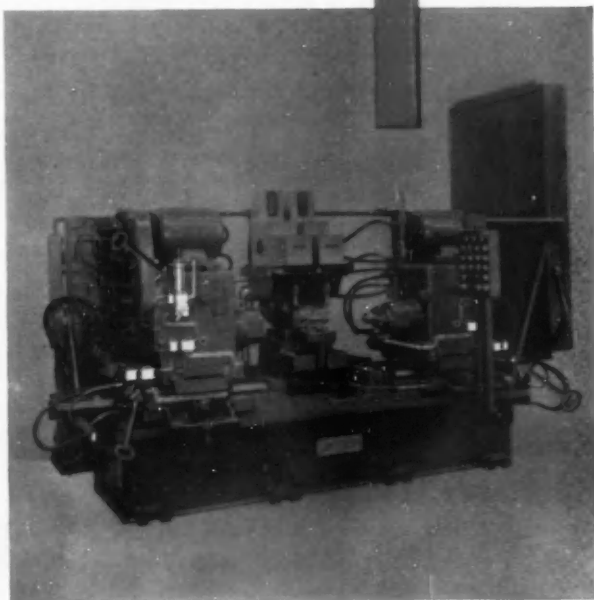
**T**HIS machine balances the connecting rod used in the V-8 engine of a well-known American automobile. As shown in the photograph, 24 rotating and sliding bearing surfaces are lubricated by a Farval manually operated system of centralized lubrication.

Not only does adequate lubrication protect the bearing surfaces, keeping the balancer always in perfect working order, but it also saves oiling time, labor and lubricant. A few strokes of the pump handle periodically, by the regular machine attendant, delivers a measured amount of lubricant to each bearing surface. Failures just don't happen. Oil cans and grease buckets are eliminated and oilers can be put on other productive work.

Farval is the ideal system of centralized lubrication for industrial machinery and other equipment, especially where uninterrupted operation is important. Farval can be installed easily and inexpensively on almost any machine at any time—either by the builder when new or on an older machine by the owner. Experience shows that a Farval system, manual or automatic, usually pays for itself in a very short time in the savings it effects in bearing expense, labor, lubricant and elimination of interruptions to production.

Farval engineers are at your service—to analyze your lubrication problems and advise on the application of modern centralized lubrication systems to the equipment you build or buy. Write us and our representative will call. Or ask for Bulletin 26. The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

*Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.*



**KEYS TO ADEQUATE LUBRICATION**—Wherever you see the sign of Farval—the familiar central pumping station, dual lubricant lines and valve manifolds—you know a machine is being properly lubricated.

The connecting rod balancing machine shown above is fully automatic in all its phases, except for loading and unloading of the part, which is done by the machine operator who also operates the Farval pump once or twice per work shift. Photograph by courtesy of the builder—Inyder Tool & Engineering Co., Detroit, Mich.



# News of the MACHINERY INDUSTRIES

By Thomas Mac New

**Lack of Working Capital Causing Smaller Machinery Firms to Sell Out to, or Merge with, Larger Manufacturers in the Same Field**

## Michigan Mergers

According to a report that was received from the Prudential Acceptance Co., Detroit, a combination of rapid growth and tight working capital is responsible for the wave of mergers and buy-outs of small machinery firms by larger out-of-state manufacturers in the machinery field. Prudential Acceptance, which is the Michigan division of James Talcott, Inc., specializes in the field of finance. The company believes that the loss of the small machinery firms is unfortunate for the Michigan economy, since smaller companies provide flexibility and growth, which are usually lost when they merge with a joint corporation.

Each of the 19 companies reporting to the survey stated that the one common problem is a squeeze on working capital. Each of these companies has to invest from \$15,000 to \$20,000 in plant equipment and facilities for every worker; and in highly mechanized plants, the figure may run three to four times that amount. As a comparison, the national average is \$12,000 per worker.

It is interesting to note that the 19 reporting companies had a 20 per cent higher volume last year than during 1953. The industry as a whole was off about 25 per cent from 1953. The big squeeze in this growth industry has been liquid working capital to expand production and build inventory. Unfortunately, many medium-sized companies are too small to float public financing and yet too large for local bank financing. One of the greatest needs reported is for term loans of from one to five years.

This squeeze on working capital is primarily responsible for the large number of mergers in comparatively recent years. The Federal Trade Commission reports that from 1948 to 1954 there were 166 mergers among non-electrical machinery producers.

It is generally known, of course, that larger companies provide most



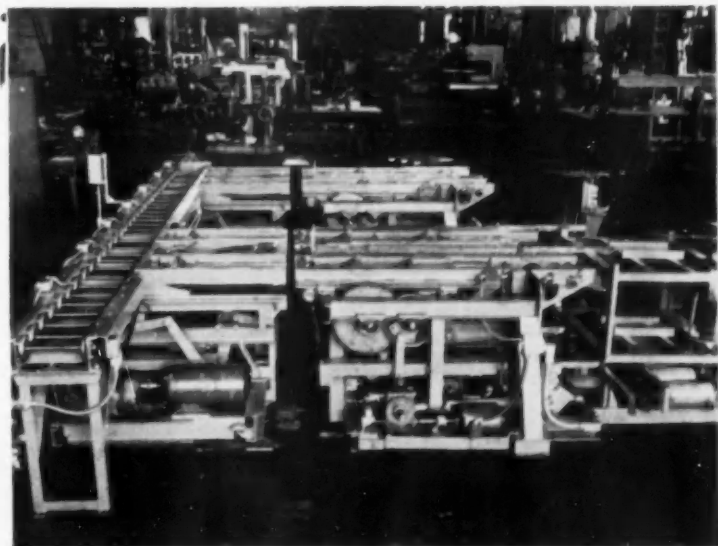
of the research and development work, but the small or medium-sized company provides flexibility, marketing ability, and aggressiveness.

## Core Conveyors

Inland State Manufacturing Co., Detroit, recently installed some rather unique conveyor equipment in one of the foundries manufacturing V-8 engine blocks. This equipment, pictured

herewith, automatically loads pasted V-block core assemblies into two tower ovens, unloads them and then will load the assemblies into the carriers of an overhead conveyor, which in turn transports the cores to the molding assembly lines. These core assemblies are pasted together at a rate of 100 per hour on a conveyor which is traveling at six fpm. This conveyor moves the cores into a roller conveyor moving at 17 fpm, thereby precluding any jam-up of materials. There are seven core plate stations on the roller conveyor with each station having a drive sprocket. The drive sprockets are driven continuously and are clutched to the axles of the roller conveyor by means of Warner magnetic clutches. The system is arranged so that the roller conveyor tends to load itself up so that each core plate will travel forward regardless of switches being tripped toward the untripped switch

(Turn to page 104, please)



*Inland State Manufacturing Co. automation equipment used in the production of cores for V-8 passenger car engine cylinder blocks.*

**NEW****PRODUCTION  
and PLANT****EQUIPMENT**

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

### Automatically Cold Spins Cones and Tubes

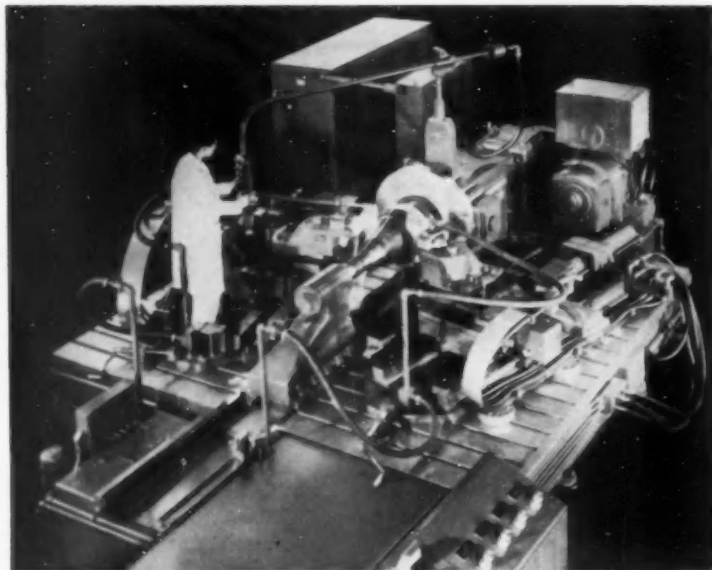
**T**HE Hydros핀, a heavy-duty machine for cold spinning cones and tubes, has been introduced. The standard machine is built in a 42 by 50 in. size, in both plain and duplex models. Special sizes also are built.

The new machine has the capacity to cold spin regular contoured hollow cones and tubes up to 42 in. in diameter by 50 in. long. Roll force, which may result in unit pressure as high as 400,000 psi, are sufficient to roll a  $\frac{3}{4}$  in. flat disk of AISI 4130 steel down to a 60 deg included angle straight-wall cone in one pass. Parts may be spun from flat disks, pre-formed blanks or rings of virtually any ductile metal. Mill-rolled sheet and plate stock, forgings and castings may all be used. Besides giving the part the desired shape, the process is said to increase the tensile strength and hardness of the material and increase its resistance to fatigue failure.

The machine consists primarily of a welded steel bed which supports the headstock, tailstock and the main slide units. A duplex machine has two main slides, while a plain machine has one. Tee slots in the bed permit universal positioning of the main slides which support the roller carriers. The hydraulically powered roller carriers are independently controlled and may be traversed simultaneously or individually. Cones of any included angle may be formed—often in one pass. Dishing or beading operations on disk-shaped parts may also be done.

When production warrants, the machine may be set up to operate through a Hydros핀ning cycle in which the movements of the saddles, cross slides and tailstock and starting and stopping of the spindle are all automatically controlled.

The machine may be equipped with a 50 to 60-hp infinitely variable speed drive to the heavy-duty spindle. The spindle is carried in tapered roller bearings designed to support both radial and thrust loads. High peripheral loads on the 36-in. diameter face plate may be supported through the use of an outboard roller mounted on



Cincinnati 42 by 50-in. Hydros핀 has welded steel bed for support of heavy duty headstock, tailstock and universally adjustable main slides. Machine is hydraulically controlled. Forces are balanced through use of opposed rollers.

the side of the headstock.

Feed rates for both the saddle and cross slide are hydraulically controlled and infinitely variable. Two 7½-hp motors drive the hydraulic pumps which provide the power for these movements. Longitudinal feed rates are infinitely variable between 0 and 60 ipm when one slide is used and 0 to 30 ipm when both slides are used. Cross slide feed rates vary from 0 to 54 ipm using one slide and 0 to 27 ipm using both slides. Power rapid retraction is provided for the longitudinal slide, cross slide and tailstock.

Each roller carrier supports a roller, a set of roller bearings and a tool ring. The carriers are arranged so that the tools may be changed without disturbing the setting of the roller bearings. Two swivel mounted carriers are supplied as standard equipment.

With a hydraulically contour tracing attachment mounted on the cross slide, parts with curvilinear wall sec-

tions or multiple diameter tubes may be formed as well as parts having straight sides. A turning attachment and a mandrel grinding attachment are also offered. *Process Machinery Div., Cincinnati Milling Machine Co.*

Circle 41 on postcard for more data



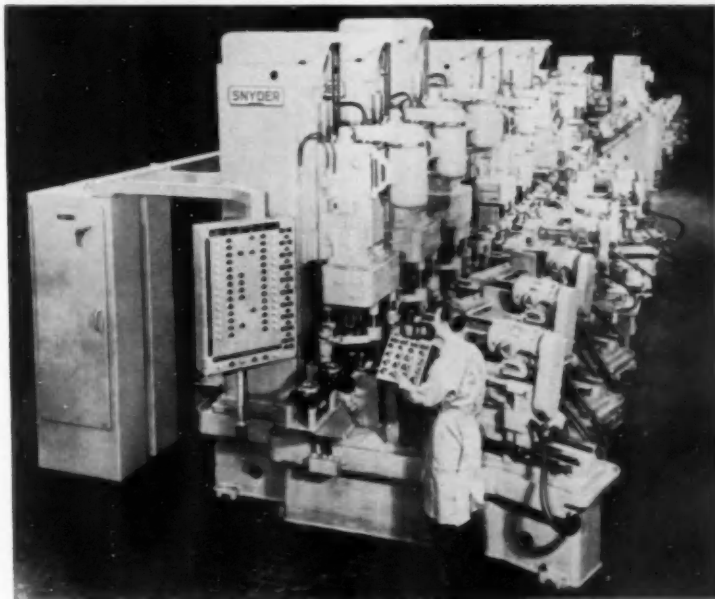
Rollers retracted to show completed Hydros핀 cone on mandrel. Roller carriers are so designed that tools may be quickly changed.

**NEW****PRODUCTION EQUIPMENT**

## Segmented Transfer Machine

**P**ARTIALLY segmented automation is being initially applied to a 111-ft long, 75-station, in-line transfer machine for producing cast iron automotive automatic transmission front oil pump bodies at a rate of 144 pieces per hour at 80 per cent efficiency. Machining operations are performed by individual machines or segments, each having individual

bar sections and make necessary minor alterations in the master control panel. The transfer machine to which this concept is first being applied performs a variety of drilling, reaming, spot-facing, chamfering, counterboring, milling, tapping and boring operations on a front pump body about 7½-in. diam and 2¼-in. thick.



The new Snyder in-line transfer machine that includes new segmented automation concepts.

base and slide units, as well as individual control panels. The only connection between the segments is a single transfer bar that moves parts in process from one machine segment to the next.

A small master electrical control panel integrates the functions of the individual panels that control each machine segment.

The transfer bar in the segmented concept is made up in sections, for easy removal or addition of base and slide units. No separate hydraulic power units are used in the segmented automation designs. Each slide unit has a self-contained power unit driven by the spindle drive motor. This power unit not only operates the slide but also all fixture operating functions.

Segments are easily added or removed, as part design requirements change. All that is required is to disconnect the transfer bar, lengthen the machine by moving the other segments, insert the new required bases, control panels and transfer

bar sections and make necessary minor alterations in the master control panel. The machine is divided into 23 segments, with all of these segments being made up of individual bases having either vertical and horizontal slide units or both. The transfer bar lifts the parts off at dowels at each station. The machine also is divided into two sections, each having individually compact master control panels, a loading station and an ejection station. Either section can be independently loaded, operated and unloaded, and material stockpiled or finished regardless of the operating condition of the other section.

The segment between the two machine sections is a hydraulically controlled index fixture that turns the part over and rotates it before it enters the second machine section. This segment is utilized as the auxiliary loading station if the first section is shut down for tool change or maintenance. Snyder Tool & Engineering Co.

Circle 42 on postcard for more data

## De-Scaling Machine

**T**HE Model ES-537 Rotoblast machine for the high production de-scaling will clean both sides of hot rolled sheet, coil, or plate simultaneously at a cleaning rate up to 360 sq ft per side per minute. The machine is equipped with eight standard wheels which are capable of throwing 480,000 lb of abrasive per hour. The machine is claimed to de-scale the surface so thoroughly that the smallest defects are observed easily thus simplifying inspection. One man can handle the operation by push-button controls.

In operation, the machine takes steel sheet into the blast chamber automatically, blasts top and bottom surfaces simultaneously, removes all abrasive from the top of the sheet, and discharges the cleaned sheet from the machine. Blast streams from top and bottom hit the sheet at exactly the same point so there is little tendency to warp. Abrasive is blown off the sheet as it moves past a fan tunnel after blasting. The abrasive then drops into the machine hopper and is carried up to the separator by an elevator. Scale dust and broken-down abrasive are removed after which it is returned to the Rotoblast wheels for re-use. Pangborn Corp.

Circle 43 on postcard for more data

## Colored Aluminum in Coils

**C**ONTINUOUS lengths of pre-anodized high purity aluminum in coils, known as Al-Kolr, is being offered in gold, silver and other brilliant colors available in qualities, which will take stamping, piercing, forming and drawing without destroying its high lustrous finish. This metal features other properties as: corrosion resistant together with high chemical resistance; surface hardness and resistance to abrasion; good adhesive capability; high light reflection; and excellent decorative lustre. The product is available in coils of any thickness from 0.002 in. to 0.020 in. and in coil widths from a fraction of an inch to 18 in. in normal runs and up to 24 in. in special runs. Continental Sunfast Products Inc.

Circle 44 on postcard for more data





Cross dial type milling and drilling machine, top, and Transfer-matic machine.

### Manifolds Processed on Two Types of Machines

**T**WO new machines have been announced for processing two- and four-barrel intake manifolds. The first machine, a dial type special, rough and finish mills the mounting faces and mills, drills and chamfers the water outlet pad of the manifolds.

The second machine, a Transfer-matic, rough and finish mills the carburetor pad, mills the choke pad on the four barrel, bores the carburetor port holes, drills and chamfers all holes except three in the water outlet pad, and taps all holes.

The dial type has a 145 piece per hour capacity, using seven stations—one loading, four milling, one drilling and one chamfering. It utilizes hydraulic power clamping for the work holding fixtures, automatic retraction for the milling cutters, gravity operated cam clamping for the indexing

table and pre-set tools.

The Transfer-matic produces 140 manifolds per hour at 100 per cent efficiency. It has 13 stations—one loading, 11 working and one unloading. A unique feature is the push button changeover from production of the different manifolds.

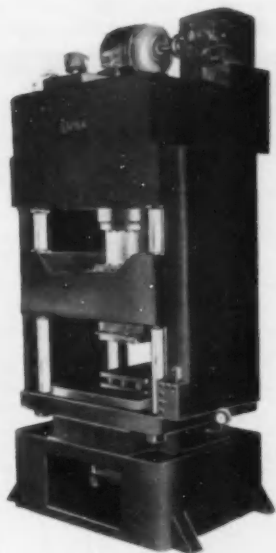
The initial part location is from port openings. The transfer mechanism for moving parts between stations is a lift-and-carry type. The use of pre-set tools with the Machine Control Unit reduces downtime for tool changes.

Both machines feature hardened and ground ways, complete interchangeability of all standard and special parts for easy maintenance and construction to JIC standards. Cross Co.

Circle 45 on postcard for more data.

### Hydraulic Press

**M**ODEL 300 single action hydraulic press is electrically controlled for either automatic or semi-automatic operation. The slide return may be controlled by either pressure



Clifton 300-ton single action press.

or length of stroke setting. The slide return may be inched up or down or the press manually operated when the slide is in the up position. The pump bypasses at zero pressure. The open rod press may be supplied with hydraulic cushions in the bed for metal drawing applications. It is built to meet practically any speed, stroke or platen size requirement, in tonnage capacities of 50, 100, 150, 200 or 300 tons. Clifton Hydraulic Press Co.

Circle 46 on postcard for more data.

### Impact Wrench

**S**IZE 4U-SD electric Impactool has been placed on the market as a standard duty model for applications where maximum power and speed is not required. The impact mechanism and all other construction features are similar to the recently announced heavy duty size 5U Impactool. The new size is a multi-purpose tool being readily adaptable to drilling, reaming, tapping, screw driving, wire brushing, etc. Ingersoll-Rand Co.

Circle 47 on postcard for more data.

## Angle Drills

Two series of heavy-duty angle head drills, for drilling in confined or obstructed areas, are being produced. Rated at  $\frac{1}{4}$  in. capacity, these portable air-powered drills are of-



Buckeye A series with 360 deg head,  $\frac{1}{4}$ -in. capacity.

fered with either 90 or 360 deg angle heads. The later can be locked in any position within full circle, permit drilling at any angle. Low tool head height and elimination of all exposed moving parts are claimed as features.

Both series of drills are available in lever or lock button throttle models, in a choice of seven speeds. Buckeye Tools Corp.

Circle 48 on postcard for more data

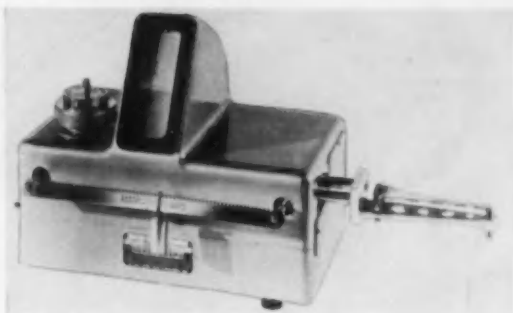
## Oscillograph

THE PM-20 general-purpose oscillograph for static or dynamic testing of all types of industrial or aircraft equipment will record up to 71 individual variables on one oscillogram when combined with suitable transducers and amplifiers. A wide choice of galvanometers, usable up to 6000 cps, provides flexibility of measurement.

The unit features two separate galvanometer mounts, permitting simultaneous use of both wound coil and bifilar galvanometers. Its drive system does not use change gears to obtain the record-speed range of four to 500 fpm. Two interchangeable idler gears provide the entire ad-

A center tower shadowgraph moment balance classification scale for checking jet engine compressor and turbine blades. Model 4202-B-TB has a 500-gram total weight capacity. The projected shadow on the illuminated dial gives a true reading when viewed from any angle and errors due to parallax reading are eliminated, according to the maker. (Exact Weight Scale Co.)

## Moment Balance



Circle 49 on postcard for more data

justable-speed range, with only seven interchanges of the idler gears. An automatic shutter closes as the 100-ft record holder is released from the oscillograph, reducing the possibility of fogging records during transportation. Alnico magnets in the ends of the spools make possible rapid, snap-in positioning of the spools, even in darkness.

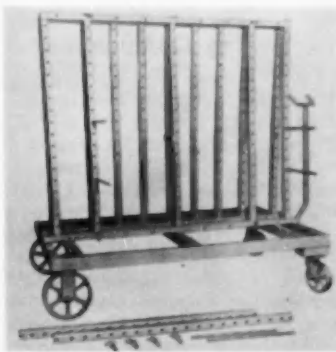
Other features include ease of adjustment, service and lamp replacement, compact controls, automatic control of record length and automatic record numbering, trace interruption for identification purposes, and timing lines. D-C and a-c models are available. General Electric Co.

Circle 50 on postcard for more data

## Holds Parts Safely

PARTS such as light metal castings, gears, diesel parts and other items costly to replace when damaged can be held safely in a movable unit which supports various shaped products by means of movable pegs. Rigid and swivel casters make it easily movable.

The Peg-Rack conveyor, with baked enamel finish, has pegs adjustable on



Peg-Rack conveyor truck

three-in. centers and uprights adjustable on six-in. centers. The standard size is 24 by 60-in. base 66 in. high uprights, but it also may be built to suit individual applications. Standard capacities are 1000, 2000 and 3000 lb. Rack Engineering Co.

Circle 51 on postcard for more data

## Four Head Roll

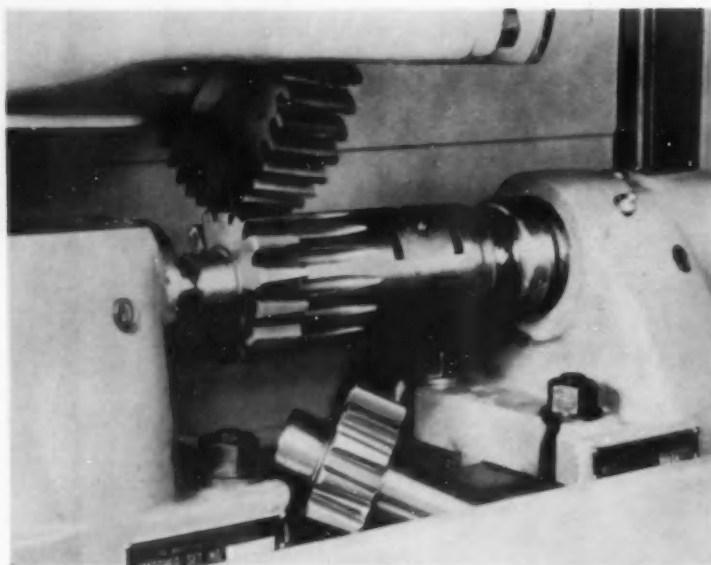
A NEW design of Turks Head is said to combine features formerly requiring two distinct models. This new development permits the forming of most special shapes with a simple roll change, and the forming of all conventional squares and rectangles within the head's capacity by simple roll adjustment. Model TH features separate adjusting screws which control horizontal and vertical adjustments of slides No. 1 and 2. Slide No. 3 is capable of horizontal adjustment only, while slide No. 4 is adjusted vertically. The new independent adjustments of slides 1 and 2, plus the horizontal travel of slide No. 3, permits setting the type TH Turks Head for either the universal or special operation. Bearing capacities have been substantially increased. Fern Mfg. Co.

Circle 52 on postcard for more data

## Diaphragms

SPECIAL-PURPOSE diaphragms for valves, controls, piping and process equipment, made from chemically inert fluorocarbon resins, are now available. Known as Fluoroflex-T (Teflon) diaphragms, they are recommended for applications involving acids and caustics, hot lacquers, steam, synthetic oils, jet fuels, gases and vapors under extreme conditions of temperature. Resistoflex Corp.

Circle 53 on postcard for more data



A closeup view of the tapered teeth on the patented rotary shaving cutter, and the mounting of the steering gear segment in the arbor and dummy gear assembly. A steering gear segment is shown at the front as finish-shaved.

### Gear Shaving Process

A NEW process for shaving conical involute (tapered-tooth) gears will first be applied to shaving teeth on power steering gear segments. It makes use of a special patented conical helical shaving cutter and can be performed on standard Red Ring diagonal rotary gear shaving machines.

The segment is mounted in an arbor assembly having steel dummy teeth which complete the tooth circumference of the gear segment. The steering gear segment is located in correct axial location in the work arbor and dummy gear assembly by clamping the gear against the face from which it was generated in the previous gear tooth roughing operation. Then the gear and arbor unit are mounted between centers in mesh with the cutter on a standard rotary gear shaving machine set up to shave the gear by the diagonal method. The cutter and work gear centerlines are set at a slight crossed axis angle for the shaving operation.

Operation of a pushbutton control on the shaving machine causes the work gear assembly to feed across the cutter on a diagonal path at 90 deg to the centerline of the cutter. The work gear feeds back across the cutter and the gear and arbor unit is removed.

Cycle time for the conical gear shaving operation is at least as fast as for any other gear of similar size

and tooth specifications produced by the diagonal shaving process. The diagonal process permits shaving operations to be performed in about half the time required by the conventional shaving method in which the work gear is reciprocated parallel to the cutter axis while being fed to depth.

About 0.004 in. of stock is removed from the conical involute gear tooth thickness during the shaving process. A typical sector has five conical involute, tapered-teeth that mesh with a five DP rack having a normal pressure angle of about 20 deg.

The special shaving cutter used to shave this gear by the new process has a nine-in. OD and is about 1 1/2-in. wide.

Circle 54 on postcard for more data

### Honing Compound

HEAVY viscous oil compound No. 155-DS, commonly used in combination with kerosene to cut friction, produces a smoother finish on work than heretofore obtainable with straight kerosene. It prevents chips from "burying in" on the surface of stones and leaves a freer cutting stone which does not have to be redressed as often. It will not deteriorate or turn rancid while in use or in storage tanks. International Chemical Co.

Circle 55 on postcard for more data

### Exhaust Valve

A NEWLY designed quick exhaust valve is now in production. Automatic opening of an oversized exhaust upon the reversal of the main operating valve is designed to promote almost instant discharge of exhaust at the cylinder. Four models are available with pipe sizes of 3/4, 1 1/2, 2 and one in. Pressure rating is 125 psig and the maximum recommended operating temperature is 175 F. Ross Operating Valve Co.

Circle 56 on postcard for more data

### Press Control Arm



An adjustable press control arm provides a flexible method of positioning the "run" and "stop" buttons on presses. The control buttons are mounted on a bar attached to an adjustable telescoping arm, to permit any desired height adjustment. Major movement front to back and left to right are made by swinging the arm to the desired position on its universal ball joint connection. Although the unit is permanently mounted on the press, the arm can be swung completely clear of the working area when changing dies, and can be instantly relocated when production is resumed. (Danyl Machine Specialties, Inc.)

Circle 57 on postcard for more data

### Coring Method

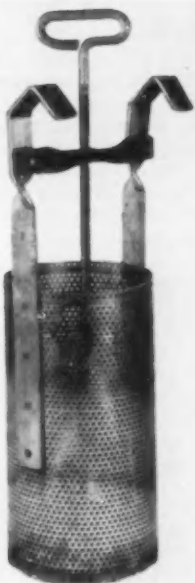
PROVIDING accurate passageways through light alloy castings the McCannacore process is basically a new method for coring intricate passageways in the casting without using metallic tubular inserts or machining. It involves a rigid material fabricated to the desired shape, which is removed chemically. The process is at present limited mainly to round holes 1/8 in. in diameter and smaller. Hills-McCanna Co.

Circle 58 on postcard for more data

## Plating Basket

**A**NODIZING of small metal parts is easily handled in an aluminum anodizing basket. Welded and riveted, it features an adjustable cover to hold the correct amount of tension on the parts, depending on the load carried. It is 6¼ by 24 in. overall, with the aluminum handle and threaded bar ½ in. in diameter. The basket is made of 11 gage aluminum with a ⅜ in. perforated hole, staggered ⅝ in. The hangers are 1 by ⅜ in. aluminum flat stock, riveted to a copper flat stock bar. Wiretex Manufacturing Co.

Circle 59 on postcard for more data



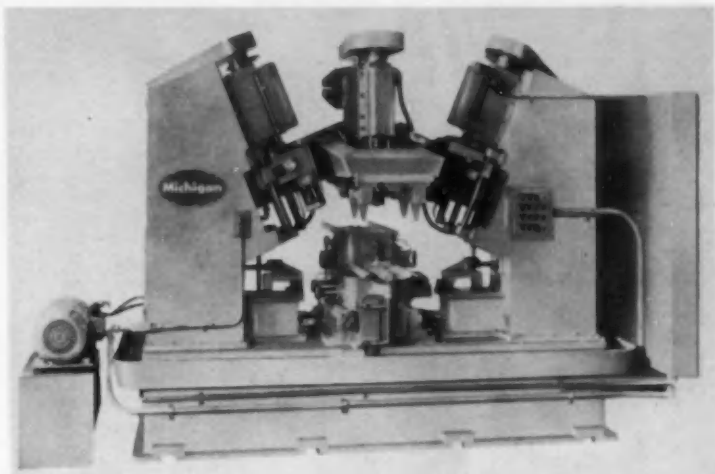
Aluminum anodizing basket.

## Cylinders

**C**YLINDERS for air pressures up to 200 psi or hydraulic service up to 2000 psi comply with both pneumatic and hydraulic JIC standards. New cup seals are used on piston and rod. Heavy web sections are provided for strength required. A single cartridge contains both piston rod seal and rod wiper. Internal damage and excess noise at high speeds are prevented by newly designed cushions. Bore sizes run from ½ to eight in. and in seven different mounting styles, which include flange, swivel, base and tie-rod mounts. Any stroke length may be had. Automation Products Div., Bill-Die Corp.

Circle 60 on postcard for more data

## Special Machine Drills Chassis Frames



Frame drilling machine with 19 spindles

**A**UTOMOTIVE frames are positioned, drilled and unloaded automatically through a 19-spindle machine. Production is 160 frames per hour. The machine automatically positions the frame over locating pins, lowers it and clamps in place. Components are two five-spindle heads and one single-spindle driller on self-contained

power units, and an eight-spindle Angle-Matic head. On the later, the two spindles feed horizontally to the left, two feed to the right, and two each left and right at 60-deg angles, using one feed mechanism only. The machine complies with JIC standards. Michigan Drill Head Co.

Circle 61 on postcard for more data

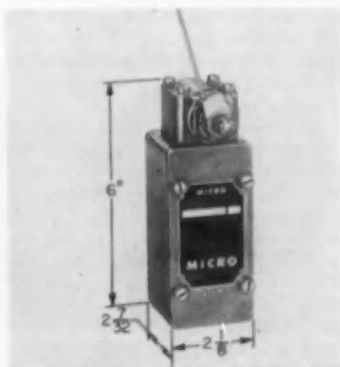
## Dew Point Controller

**A**UTOMATIC controlling, recording, and proportioning enables the heat treater to set his atmosphere generator or furnace in equilibrium with any steel to be heat treated. The Carbtrol instrument makes automatic control of the atmosphere as simple as automatic temperature control. The heat treater merely sets the pointer on the control instrument for the carbon content of the steel he wishes to treat and the instrument will automatically control the atmosphere generator to produce a protective atmosphere in equilibrium with the steel. It automatically corrects the air-gas ratio of the generator to produce a constant dew point, or carbon potential, as the raw gas supply and pressure varies. When used with the firm's Hyen atmosphere as a carrier gas, it automatically controls carburizing and carbonitriding processes to produce the carbon in the case to any desired specification. Soot is also eliminated during the entire cycle. Neutral hardening, bright copper or silver brazing of medium and high carbon

steels, carbon correction, sintering of powdered metals and other processes using endothermic generator gas are also automatically controlled. Lindberg Engineering Co.

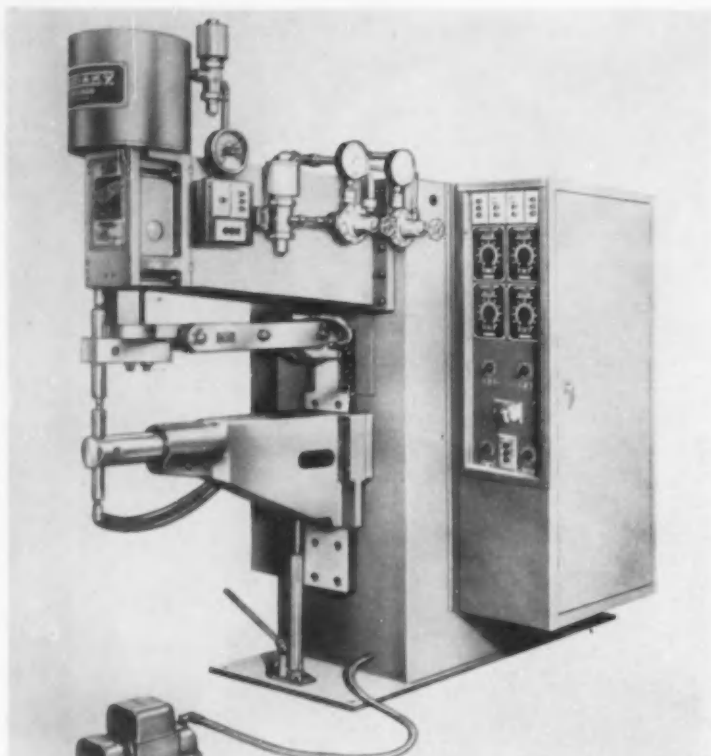
Circle 62 on postcard for more data

## Switch



Low-force aluminum heavy-duty limit switch can be operated with only 2½ oz. force. Sixty-deg overtravel is provided on various models. (Micro Switch Div. of Minneapolis-Honeywell Regulator Co.)

Circle 63 on postcard for more data



For aircraft or large and small industrial shops, the Sciaky 2ST is a flexible machine that will operate on a limited power supply.

### Improved Air Press Welder

THE new design of a standard air-operated press welder uses the maker's three-phase principle. The PMCO 2ST spot welder is one of a series in sizes OST through 7ST. Capacity is 100 kva at 50 per cent duty cycle. Throat depth is 36, 48 or 54 in. Electrode force is 4300 lb at 80 psi line pressure. It is said to make 100 welds per minute on two 0.040 in. light alloy sheets, or 130 on clean mild steel.

To meet aircraft specifications, the three-phase principle tailors the wave shape of the welding current to the material—aluminum, magnesium alloys, low carbon steels, austenitic steels, nickel alloys, etc. It minimizes electrode pickup. Among the current factors controlled are current size, magnitude, decay and direction. A pulsating cycle can be used for thick sections. Variable pressure control is effective for controlled forging.

On the ST welders, a diaphragm pressure cylinder provides a fast, smooth follow-up of pressure and rapid forging. Pressure is transmitted through a hollow, octagonal

ram guided on roller bearings. The upper arm is fabricated steel; the lower arm of copper alloy is raised by a hydraulic jack. Three-phase transformers are made by this manufacturer. Optional equipment includes a pre-heat, quench, post-heat and descaling sequence for welding high carbon or air hardening steels. *Sciaky Bros., Inc.*

Circle 64 on postcard for more data

### Quenching Oil

A QUENCHING oil to give extremely fast cooling rates in conventional quench setups has been announced. Voluta Oil 23 reportedly has made it possible to quench low carbon or low alloy steels in oil, where formerly water was necessary. Cooling rate is sufficiently high initially to avoid unwanted transformation products, yet slow enough in the final stages to control the dangers of warpage, cracking, or distortion. Also, the high heat removal rate of the new oil has often made step-

quenching procedures unnecessary. Other advantages claimed for this product are its high water tolerance and its low volatility and drag-out losses. The oil is generally compatible with heat treating salts and does not form any insoluble soaps when parts are quenched from salt baths. The oil will not bake onto the hardened parts. The flash point is 380 F and the fire point 425 F. It typically has a pour point of 25 F, and a viscosity of 121.9 SUS at 100 F, or 41.5 SUS at 210 F. Its specific gravity is 29.9 degrees API. *Shell Oil Co.*

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### Spring Gage

A<sup>N</sup> electronic gage for use on automatic spring coilers measures the tolerances on the free length of each spring as it is coiled. It automatically accepts a correct spring and rejects and discards springs too short or too long. Lengths can be held to plus or minus .001 in. The mechanical unit has a moving arm with adjustable contact blades that sweep across the front end of the spring and measures the length as it is coiled. It transmits this data to the electronic unit which controls the air operated rejection unit. Satisfactory springs are cut and dropped as usual. The gage measures spring lengths from 1/8 in. to four in. *Carlson Co.*

Circle 66 on postcard for more data

### Stacker



Portelelevator "R" is an electric-mechanical lift for loads up to 3000 lb. Maximum travel is 41 in., at up to 58 ipm. Power to the three-hp worm gear drive is through a reversing magnetic starter. (*Hamilton Tool Co.*)

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## Ultrasonic Device

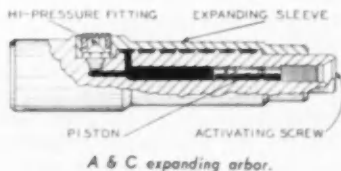
**L**ow frequency flat-type transducers are said to improve the efficiency of ultrasonic cleaning methods and extend the size of workpieces that can be handled. Low ultrasonic frequencies have greater penetrating ability and therefore greater cleaning efficiency than the higher frequencies previously employed. They are generated by barium titanate transducers of new design. They freely curve around corners and sharp angles, penetrate more easily into recesses and capillaries to remove all dirt, oil, grease, chips and lapping compound.

The flat shape of the transducers permits them to be teamed to any length or width for cleaning large shapes. Because sound energy is beamed over a wider area, small parts can now be cleaned ultrasonically without requiring critical positioning. As the transducers expand and contract under electrical excitation, the resulting ultrasonic energy causes severe cavitation in the surrounding cleaning solution. It is this cavitation that actually cleans the metal parts, subjecting them to an extremely rapid scrubbing action. Redesign of the barium titanate crystal transducers permits them to be driven at higher watt densities, so that the sound waves need no longer be focussed to produce adequate intensity of cavitation. As a result, it has been feasible to use flat transducers in production model ultrasonic cleaners. *Circo Equipment Co.*

Circle 68 on postcard for more data

## Expanding Arbors

**H**YDRA-LOCK hydraulic expanding arbors and chucks, can be operated automatically for volume production, and are said to provide re-



peating accuracy within 0.0002 in. They are adaptable to present tooling from 1/2 in. diameter and up. Expansion is accomplished by hydraulic pressure. By turning the activating screw, the piston is moved forward and the hydraulic fluid is forced from the piston chamber through a port



Federal gage handles jet engine blades from two to six in. long.

**A** FULLY automatic, four-station, in-process sorting gage, model 144 B-34, measures 20 dimensions on 13 different sizes of jet engine stator blades. Operating at a speed of up to 40 workpieces per minute, the gage directs reject parts out of the manufacturing line.

The gage is conveyor fed and mounted in the continuous line. A walking beam moves work through. All measuring is done with the work at rest and the gaging units in forward position. Resultant size signals

operate colored tolerance lights in power unit and set a synchronized memory for later sorting. Good work flashes a green light.

The semi-finished blades are checked for: tongue thickness, tongue projection, angle at top of base, base height, base width, leading edge location, blade length at centerline, angle at end of blade, air foil location, blade angle, warp angle, base length and base end angle. Some dimensions are duplicated. *Federal Products Corp.*

Circle 69 on postcard for more data

into the area between the expanding sleeve and the arbor body. This stretches the steel sleeve uniformly outward with controlled repeating accuracy. Maximum expansion is approximately 0.003 in. per inch of arbor diameter. Arbors can hold a multiple number of parts. *A & C Engineering Co.*

Circle 70 on postcard for more data

## Riveter

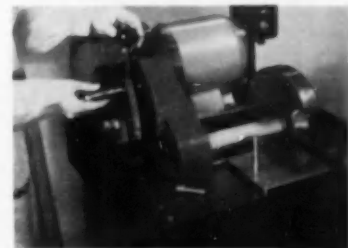
**T**HE SPG special threaded barrel pneumatic portable riveter is a compact, two-in. diameter cylinder adaptable for single and gang operations in custom tooling and fixtures. It was designed for fabrication in multiple of parts very small to medium-large. Two-in. center distances are possible in the simultaneous heading or heading of fasteners in silver, brass, copper, mild steel and stainless steel.

Standard units are offered with capacities up to 7/32 in. in solid mild steel at full air pressure. There are three capacity sizes: 1, 3/4 and 1/2 in.

pneumatic piston diameters. The spin-impact units are capable of a range of blows from 6000 to 16,000 per minute, pounds per blow ranging from 1/2 to 1 1/2 lb. Operating air pressures range from 30 to 110 psi. *Lemert Engineering Co., Inc.*

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## Hose Cutter-Skiver



Hydraulic wire braid hose, either cotton or rubber covered, can be finished with the model 1149-12 powered cutter-skiver. In the case of rubber covered hose, removes the outer layer of rubber preparatory to assembly with re-usable Hose-Lok fittings. *(Parker Appliance Co.)*

Circle 72 on postcard for more data



# NEW

# PRODUCTS

## AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

### Sealing Nut

The addition of a sealing compound to washer type lock nuts, provides a complete seal around the stud threads and stud clearance when tightened. A one-piece lock nut does the job of



an ordinary nut, lock washer, flat washer and sealing washer. Resilient spring steel construction greatly reduces stud damage and dimpling of body stock. The single thread removes plating burrs while tightening. Thread engagement is high on the stud, thus studs need no threads at the base. The resilient spring steel washer base cushions the shock of power drivers on studs. The washer spans the stud hole, and cannot chafe the edges to cause corrosion. Easy, fast assembly is achieved with standard power tools. Sealer-type washer lock nuts are available in No. 8-32, 10-24, 12-24 and 1/4-in.-20 sizes. *Palnut Co.*

Circle 26 on postcard for more data

### Valve-Pump

Hydraulically balanced plug type three-way valve-and-pumps are available in single or double shaft models. The SY series is rated for 1000 psi duty, is subject to 2000 psi overload

and 3000 psi shock load. Of heavy-duty construction, the series is available in five sizes, developing from eight gpm to 22 gpm at 1000 rpm—1000 psi. Reversible, the combination is designed for either rotation and PTO drive.—*Wisconsin Hydraulics*,

Circle 27 on postcard for more data

### Roof Coating

Permite "3-A" Roof Coating, a new compound of aluminum, asbestos and asphalt, has been introduced to provide complete protection to all types of roofing surfaces except wood. It is a combination of high-grade, large-flake aluminum pigment and steam-blown refined asphalt compound, reinforced with a premium grade of long staple Canadian asbestos fiber. The manufacturer states that this combination—utilizing the reflective, flexible and heat-resistant qualities of the agents—results in a durable, resilient coating that is immune to chipping, peeling and sun-damage failures. It is recommended for roof applications on industrial and commercial buildings, also on mobile home, bus, truck and trailer roofs. *Permite Paint Div., Aluminum Industries, Inc.*

Circle 28 on postcard for more data

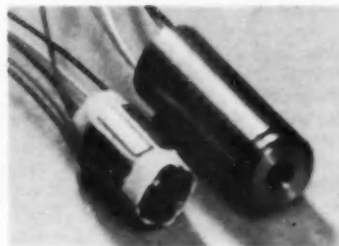
### Small Motor

A tiny motor, originally designed for use in the gyro component on compass-controlled directional gyro-compass system, is believed to be the smallest motor currently used on aircraft. Rated at 26 v and weighing 1.2 oz, it is 3/8 in. in diameter and 1.2 in. long. Its no-load speed is 21,000 rpm, and it is designed to withstand ambient temperatures in the range of -55 C to +90 C when operated as a control motor, and is built to provide satisfactory performance at altitudes up to 60,000 ft.

This two-phase, low inertia servo motor may be used for null-method measurements as well as to provide the power required to initiate control.

In one of the simplest of these circuits, one phase of the motor is continuously excited from the 400-c line,

while the other is fed from the output of a servo amplifier. The necessary 90-deg phase shift between the input to the fixed phase and the variable phase may be introduced in the



error signal circuit, in the amplifier, or in the fixed-phase circuit. In this way, the error signal from a synchro-control transformer may be amplified and used to initiate control through the servo motor. The motor may also be used as a power failure indicator or as a power-operated brake. *General Electric Co.*

Circle 29 on postcard for more data

### Nylon Fastenings

In-stock supplies of nylon machine screws of various sizes are available from a firm making its entry into this field. Properties include tensile strength at 77 F of 10,900 psi, flexural strength of 13,800 psi, and stiffness of 250,000 psi. Nylo-Fast screws are reported to conform to rough surfaces and to lock in place, especially when oversize screws are used. *Anti-Corrosive Metal Products Co., Inc.*

Circle 30 on postcard for more data

### Pure Titanium

Titanium and titanium alloy mill products are guaranteed to meet a new 0.1 per cent maximum carbon content requirement. Titanium meeting this specification can be machined faster. With a vacuum double melting process, carbon can be held as low as the amount inherent in the sponge raw material itself. *Mallory-Sharon Titanium Corp.*

Circle 31 on postcard for more data  
(Turn to page 92, please)

# Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

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## FREE LITERATURE

### Oscilloscope Components 1

A matching network and integrating galvanometer is designed to cancel effects of frequency, making output of vibration pickup proportional to amplitude only over 8 to 800 cycle range. Bulletin CEC-1517C. *Consolidated Engineering Corp.*

### Finishing Aluminum 2

Various electroplated and organic finishes for aluminum are discussed in Technical Advisor No. 29, published by *Reynolds Metals Co.*

### Oil Seal 3

Case histories using Clipper oil seals in petroleum, automotive, mining, earth-moving, aviation, iron and steel, machine tool and process industries, as well as tabular data are given in a 28-page manual. *Johns-Manville.*

### Lock Nut 4

Huglock, self-locking nuts are one-piece, all-metal prevailing torque type. Engineering data, specifications and price list have just been released in a 24-page section of their catalog by *National Machine Products Co.*

### Lock Nuts 5

Flexloc all-metal one-piece self-locking nuts can be used either as a locknut or a stop nut. The fastener is unaffected by temperatures up to 550 F, or when made of corrosion-resisting steel, up to 750 F. Four-page folder 866. *Standard Pressed Steel Co.*

### Welding Head 6

Product Data Sheet, PD 2-201, describes the Model J Welding Head, a compact precision welding unit for small parts and sub assemblies. *Raytheon Manufacturing Co.*

### Dust Collectors 7

Control of hot or moist, explosive or combustible, corrosive, abrasive or obnoxious dusts is discussed in four-page bulletin No. 919 describing the type CW-1 centrifugal wet dust collector. *Pangborn Corp.*

### Accumulators 8

Piston-type accumulators and newly announced pre-charging accessories are described in catalog 1536. The line includes 11 sizes, ranging from 10 to 1155 cu in. Rated working pressure is 3000 psi. *Industrial Hydraulics Div., Parker Appliance Co.*

### Sintering Furnaces 9

Bulletin B-101 covering furnaces for sintering powder metal products illustrates and describes batch and continuous pusher and roller hearth types from 15 to 330 kw. *Drever Co.*

### Overhead Conveyors 10

Flexible overhead handling installation in the Westinghouse jet engine plant, Kansas City, involves Trambeam crane and monorail equipment. Bulletin M-29 illustrates uses. *Whitcomb Corp.*

8/15/55

VOID After October 15, 1955

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## Oil Filters

11

Bulletin 101 describes the Honan-Crane full flow filter, which offers operators flow rates of up to 900 gpm at very low pressure drops. It is available in nine different sizes. Multi-Cartridge filter is featured in bulletin 201. Six different types of cartridge elements can be used interchangeably. Bulletin 301 covers bulk type filters for depth-type filtration and applications where oil must be kept absolutely clean. *Houdaille-Hershey of Indiana, Inc.*

## Aircraft Steels

12

A 76-page booklet presents six papers discussing a nickel alloy steel capable of providing tensile strengths up to 300,000 psi. Includes heat treatment, processing and design considerations, 20 tables and 61 figures. *International Nickel Co., Inc.*

## Print Remover

13

Cosmoline 1070 fingerprint remover is described in an illustrated four-page bulletin. It is useful in protecting highly polished or super-finished surfaces from corrosion caused by the lactic acid, urea and sodium chloride residue of ordinary fingerprints, particularly on non-ferrous metals and bimetallic assemblies. Meets specification MIL-C-15074A. *E. F. Houghton & Co.*

## Constant Spring

14

The constant-force Neg'ator spring as an extension or retracting number, counterbalance, expanded scale and mechanical motor does not change its force when extended. A variety of applications is shown in 16-page bulletin 310N. *Hunter Spring Co.*

## Honing

15

Brief description of the honing process and details and specifications of its line of single- and multiple-spindle vertical honing machines are the subject of illustrated bulletin 600. *Barnes Drill Co.*

## Needle Bearings

16

Design, application and use data for drawn cup, aircraft, cam follower, roller and heavy duty assemblies of needle bearings are provided by catalog No. 55, in effect an engineering short course on bearings. Index visual units provide quick identification of the various bearings, their characteristics, and applications. *Torrington Co.*

## Testing Facilities

17

A brochure outlining environmental testing services supplied is now available from *American Electronic Laboratories, Inc.*

## Levers

18

Bulletin HW-B3 presents a line of hand levers and control units, including a chart to show how special levers are assembled from standard forgings. *Batavia Metal Products Corp.*

## Pressure Gage

19

Data and applications of the switch model mechanical pressure gage, details of the switch arrangement and ratings are given in six-page bulletin PG-4. *W. C. Dillon & Co., Inc.*

## Speed Reducers

20

Line-O-Power straight line and right angle speed reducers are completely described in a 40-page booklet, engineering manual LP No. 3. Tables of ratings, construction details including gear design features, and design data for ordering are all part of the booklet. *Foot Bros. Gear and Machine Corp.*

## Fluid Drive

21

Catalog and selection guide No. 9419-9519 describing the new type VS Class 2 Gyrol fluid drive for general purpose industrial applications is now available from *American Blower Corp.*

## Control Problem

22

Steps involved in designing a control system for jet engine testing, that required high accuracy, high resolution, and a high frequency of response is described in bulletin V-4002. *CDC Control Services, Inc.*

USE THIS POSTCARD

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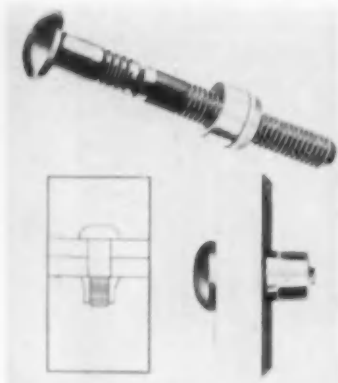
**Continental Screw Co.**  
Manufacturers of Holtite Fastenings

NEW BEDFORD, MASSACHUSETTS, U. S. A.

## NEW PRODUCTS CONTINUED FROM PAGE 88

### Panel Latch

The Paneloc rotary latch is said to be a simple and economical yet strong and durable fastener for use on hinged or removable parts, such as



inspection doors, access panels, covers, electrical control panels, machinery doors, etc.

Made of steel, cadmium plated, the latch consists of four parts: latch-screw, shim plate, anchor block and latch-nut. The latch is assembled on the access panel only. It operates with a quarter turn. *Scovill Manufacturing Co.*

Circle 32 on postcard for more data

### Synthetic Laminate

Mechanically bonded laminate reinforcing material of synthetic fibers is being introduced for the reinforced plastics industry. This material, in needled-batt structures of nylon, Orlon acrylic fiber, or Dacron polyester fiber, was developed by two manufacturers in co-operation with this supplier of raw materials.

The material is constructed by bonding the fibers mechanically, rather than chemically or thermally. Mechanical bonding is achieved by passing a carded batt through a needle loom, which, in effect, stitches the fibers to themselves. This produces a strong, blanket-like, non-woven fabric which is easy to handle and can be molded or tailored readily. The homogeneous construction permits fabrication of laminates of uniform thickness, unusually smooth surface, and equal strength in all directions. Ability of the batting to be deep drawn eliminates the necessity of pre-forming for many applications and contributes to laminate

post-formability. Batting made of these fibers has a high strength-weight ratio, contributes low moisture absorption, excellent chemical resistance, high dielectric strength, abrasion and impact resistance, weatherability, and translucency. In a laminate, the fine, uniform fibers are masked almost completely by the molding resins and blend well with molding resins of any color. *Du Pont Co.*

Circle 33 on postcard for more data

### Quick Hose Clamp

Simplified application of a one-piece clamp is said to save on both clamping time and costs. It is designed for all types of high pressure lines. The clamp is round with U-shaped folds



or lugs. Smaller size clamps have two lugs and the larger ones, three. The device is slipped on the hose or part and crimped in place by squeezing the parallel sides of the lugs together with the pincers.

There is no danger of the pincers slipping because the pressure of the jaws is approximately perpendicular to the surfaces of the parallel sides. The decrease in the clamp diameter is determined by how far the lugs are closed. To remove the clamp, the lugs are simply snapped off with the pincers. Tests on  $\frac{3}{8}$ -in. OD wire-braided hose have shown no slippage or loss of clamping action at hose burst pressures ranging from 12,300 to 12,800 psi. *Circle Clamp Corp.*

Circle 34 on postcard for more data

### Silicone Rubber

Class 700 silicone rubber is capable of remaining flexible at 600 F. The new materials are capable of remaining flexible for 150 hours or longer during continuous exposure up to the peak of the new temperature range. *Silicone Products Div., General Electric Co.*

Circle 35 on postcard for more data

### Lockbolt

A commercial lockbolt which replaces rivets, bolts and other fasteners is designed for greater speed and uniformity. It consists of two



precision made parts—a pin and a collar. In using the fastener, the locking collar is placed over the projecting pin tail and a gun is applied to pull the work together and swage the collar into the locking grooves on the pin. The pin is broken at the breakneck groove and the pin tail is automatically ejected. *Townsend Co.*

Circle 36 on postcard for more data

### Booster Pump

Model RR-11200 centrifugal fuel booster pump is designed to separate vapor bubbles from fuel to prevent high-altitude vapor lock. Installed on the motor shaft is a main centrifugal type impeller and a vapor separating impeller. Only other part is a screened by-pass valve on the side of the discharge port housing for minimum pressure drop with motor power off and fuel drawn by auxiliary means. The 0.48-hp a-c motor is uniformly cooled through direct contact inside and out with the fuel. Motor bearings are carbon-graphite composition. It has no commutator or brush problem, and is free of radio noise. No mechanical seals or shaft packings are required. *Lear, Inc., Lear-Romec Div.*

Circle 37 on postcard for more data

### Aluminum Tubing

High-strength aluminum specialty tubing made of 6066 alloy is available in a range of shapes and sizes. In addition to the high-strength characteristic, the tubing possesses high resistance to the general corrosive conditions, weldability and good surface finish. Tubing is being made square, rectangular, in special configurations, and in the conventional round form. *Harvey Aluminum.*

Circle 38 on postcard for more data





*"Amazing how little this*  
**TORRINGTON NEEDLE BEARING** *costs!"*

Initial cost of the Torrington Needle Bearing is much less than that of any comparable anti-friction bearing. But economy in first cost is only the start of savings which accrue to users of the Needle Bearing.

Because of its unit construction and small size, housings and related members can be made smaller and lighter.

Ease of installation trims costs on the assembly line, too. Just a simple operation on an arbor press places the hardened outer shell of the Needle Bearing in the housing.

Throughout the life of the completed assembly, the Torrington Needle Bearing continues to pile up benefits. Low

friction, high load capacity and retention of lubricants all contribute to the characteristically long service life of Needle Bearings.

For twenty years, our Engineering Department has helped designers and manufacturers throughout industry to adapt the unique advantages of the Needle Bearing to their products. Let us help you make the Needle Bearing "standard equipment" in yours.

See our new Needle Bearing Catalog in the 1955 Sweet's Product Design File—or write direct for Catalog No. 55.

**THE TORRINGTON COMPANY**  
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*These features make*  
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**NEEDLE BEARING** *unique*

- low coefficient of starting and running friction
- full complement of rollers
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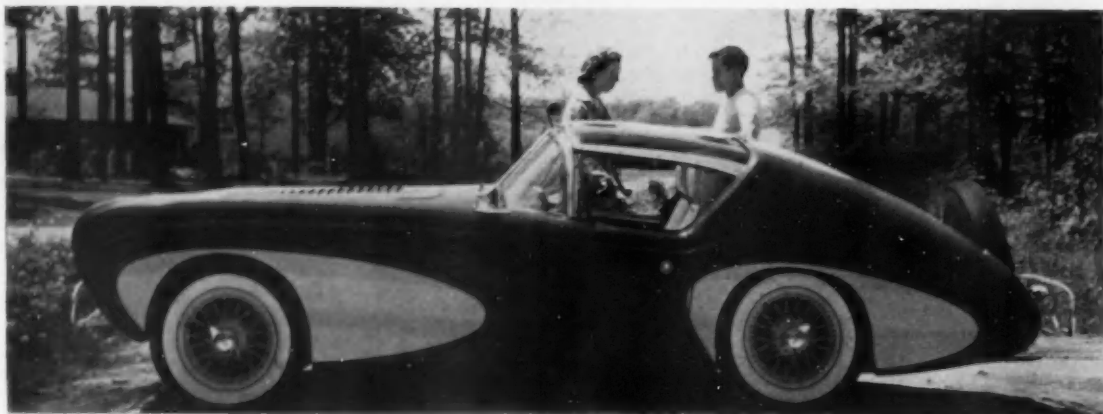
**TORRINGTON NEEDLE BEARINGS**

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

AUTOMOTIVE INDUSTRIES, August 15, 1955



# Special Convertible Car Has Sliding Plastic Top



*William Flajole's special car with plastic body and sliding roof*

**B**ECAUSE styling consultant William Flajole insisted on the practicality of a retractable car roof, an unusual dream car is about to make its debut. It will be on display at the Detroit Historical Museum, August 15-28.

The body was built by Flajole's staff of designers and modellers, directly from the renderings, bypassing the expensive stages of full-size layout and experimental body work.

Total cost for the all-Fiberglas car was \$8000 in materials and 7000 staff hours, which isn't much more than the cost of  $\frac{3}{8}$  scale prototypes which Flajole designs for his client, American Motors. Part of the materials cost represents the modified Jaguar chassis; all other materials were purchased from standard jobbers.

As illustrated, the car embodies intricate compound curves and perforated planes not previously attempted on a Fiberglas body. Even underhood fittings and hangers are molded into the Fiberglas. The design was modelled first in a full-size clay prototype. This was reproduced in plaster molds, in which the body was built up in Fiberglas cloths which were impregnated with resin.

To strengthen the flush hood and prevent buckling, it was built up into a sandwich wall with ribbon Fiberglas filler. This extra rigidity permitted stamp-

ing functional louvres (for engine cooling) the full length of the hood.

The body is built around the retractable Plexiglas canopy, which gives the effect of either an open or closed car. The canopy rolls back on tracks into the "fastback" shaped tail deck.

The mechanism of the retracting roof is simple, Flajole's group having adapted it from a sliding garage door. Although it slides easily by hand on its nylon bearings, it is motor-equipped to permit operation from the driver's seat.

The  $\frac{1}{4}$  in. Plexiglas is Rohm and Haas' recent 30 per cent transmission green, opaque to ultra-violet and infra-red rays, and especially adapted for automobile use. Detroit Macoid Co. executed the Plexiglas shape.

Bumpers are ovals of 1 inch alloy steel tubing. Flajole's bumpers were hand formed easily from standard sizes of tubing and brackets.

Seats are seven inches higher than standard, with a bolster supporting head and shoulders—along airliner easy chair lines.

The car is Flajole's personal car. It will not be duplicated for sale and will be exhibited rarely. After the August 15-28 showing in the Detroit Historical Museum, it will be seen only at a few top American and European car shows.

## **Air Conditioning Sales Are Doubled At Cadillac**

The increasing demand for air conditioning in automobiles is illustrated by Cadillac. From the beginning of the year through July 11, Cadillac reports that it has sold twice as many

of the units as during the same time last year.

When Cadillac introduced air con-

ditioning, biggest sales market was in the Southwest and Western parts of the country. Demand since, however, has spread through the Midwest and Eastern regions.

# SCHWITZER -CUMMINS

## Specialists IN FANS FOR ALL INDUSTRIES



Illustrating a 60,000 CFM fan—72" diameter—as furnished for stationary engine application for the oil fields.

AMONG THE MANY INDUSTRIAL USES FOR WHICH SCHWITZER-CUMMINS IS A MAJOR SUPPLIER OF FANS ARE—

- INDUSTRIAL ENGINES
- GENERATING SETS
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- WIND CHARGERS
- CROP DRYING
- OIL DRILLING
- FILTER AND PURIFYING
- INDUSTRIAL VENTILATION
- UNIT HEATERS
- COOLING TOWERS
- DRY KILNS
- TRUCK REFRIGERATION
- MARINE VENTILATION
- PORTABLE WELDERS
- FIRE ENGINES
- ALL DIVISIONS OF AUTOMOTIVE MANUFACTURE

For 37 years we have supplied fans of all descriptions to the leaders in many different industries, automotive and stationary. We are so well equipped in experience and facilities that you will find us a superior source for your fan needs. We can meet your own specifications on fans of all sizes and types from 6" to 84" no matter what the operating characteristics, the blade shape, or material.

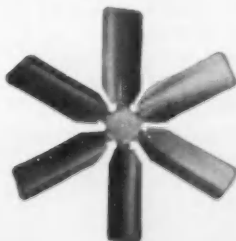
Send us your specifications and see if we cannot furnish you with a superior fan that will improve performance and save you money.



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Condenser Fans for Small Air Conditioners



Large Exhaust Fans for General Ventilation, Attic Ventilators, etc.

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*Cooling Fans for Over a Third of a Century*

# The BUSINESS PULSE

*Practically No Weakness Found in Any Areas of the National Economy at the Present Time. Total Civilian Employment Brought to New Record by Upswing in Manufacturing and General Expansion in Most Activities*

This Survey Is Prepared  
Exclusively for AUTOMOTIVE  
INDUSTRIES by the Guaranty  
Trust Company of New York.

## General Activity Continues Upward

The overwhelming majority of incoming business reports continue to be favorable. They document the fact that general activity was at a new all-time high and still on a moderate upgrade as the first half of the year came to an end. They also suggest that the midsummer lull this year will probably be somewhat less marked than it normally is.

As a result of this impressive performance, hardly anyone is currently talking about the possibility of trouble during the remainder of the year, whereas only a few months ago this was the favorite topic for speculation among observers. One still hears a few cautionary words from time to time to the effect that the real strength of business cannot be gaged until we see whether activity spurts ahead with its usual seasonal vigor after Labor Day. But even this type of comment is infrequent.

The fact is that there are very few areas of the economy that qualify as likely sources of weakness at present. A troublesome clean-up problem on 1955 models does seem to face the automobile industry, but manufacturers express confidence that the job can and will be done. A good deal of concern has been voiced also over the rapidly rising volume of consumer indebtedness, but so far collection experience has been reasonably satisfactory. Residential building appears to be easing, but there seems an excellent chance that this will be balanced out by a rising volume of non-residential activity. These possible weaknesses are of such questionable importance, in other words, that today's prevailing optimism has real plausibility.

## Must All Booms End?

None the less, a reminder seems very much in order: There never has been a boom without an end.

Theoretically, perhaps, there is no reason why an uptrend ever has to be reversed. If businessmen were always accurate in their anticipations of the future or if the number of mistaken judgments by the business community remained relatively few and unimportant, the economy might drive ahead indefinitely at a rate of activity involving roughly full utilization of resources. Historically, however, the truth is that not only do businessmen make mistakes in judgment, but that occasionally these errors are bunched together, as it were, in greater than average number. When this has happened, recessions and even depressions have ensued. Have we suddenly arrived in a new age free of the old pattern? There is little reason to believe that such is the case. Confidence, of course, can be an important stimulant to activity to the extent that it encourages sound business expansion. But experience shows that confidence has a way of mushrooming into overconfidence, which leads to expansion of a particularly speculative nature. There is no reason to suppose that the present situation is uniquely immune to this danger.

## Gross National Product Reaches New Record

A review of gross national product estimates for the second quarter of the year discloses the remarkable forward thrust which has been achieved by the economy. On a seasonally adjusted basis, GNP reached a record annual rate of \$383 billion in that period. This was \$7.7 billion above the revised \$375.3-billion first-quarter rate, which had been the previous high, and \$25.4 billion above the year-earlier level. Approximately half of the strong advance from the first to the second quarter of this year was attributable to increased personal consumption expenditures, the remaining part of the rise deriving principally from higher plant and equipment outlay and an acceleration of inventory accumulation.

These aggregates point up the unexpectedly huge strides made by the economy since last year's recessionary low. But in order to understand the specific character of the business trend it is necessary to refer to more particularized data.

The pattern of industrial production at the end of the second quarter was of especial analytical significance.

*(Turn to page 106, please)*

*A Mechanical Eye...*



## Ford Cuts Tool Costs with Cross Machine Control Units

One of the  
Cross Machine Control Units  
at Ford Motor Company's  
Cleveland Engine Plant

(U. S. Patent Nos. 2579138  
and D-163935. Others pending)



According to records, 221 Cross Machine Control Units in operation at Ford Motor Company Plants are assisting them greatly in improving tool trouble conditions.

One reason for this is that the Machine Control Unit provides a definite and convenient place for storing tools . . . tools which are pre-set so they can be placed in operation immediately without making machine adjustments.

Another reason is that the Cross Toolometer, an integral part of the Machine Control Unit, provides a standard for the performance of the tools, thereby enabling corrective action to be taken when necessary. The Toolometer dial is set to indicate the number of pieces which a given tool should produce. When the dial has reached that pre-determined figure, the machine automatically shuts down and the tools are changed. At the same time, other tools indicated by the Toolometer as approaching the end of their usefulness are also changed to take full advantage of the machine shut down.

The Cross Machine Control Unit is helping to keep Ford production going and is also assisting greatly in controlling tool life.

See us in Booth No. 1118 at the Machine Tool Show

Established 1898

THE **CROSS** CO.  
DETROIT 7, MICHIGAN  
*Special* MACHINE TOOLS

# AIR BRIEFS



By **RALPH H. McCLARREN**

## National Aircraft Show

Virtually all major segments of the U. S. aircraft industry will display their contribution to American Aerial supremacy at Philadelphia's International Airport on September 3, 4 and 5, 1955. During Labor Day weekend more than 300,000 persons are expected to attend the National Aircraft Show.

On each of the three days the military services will demonstrate prowess of American airpower in a three-hour aerial show. Included will be bombers, fighters, interceptors, transports, helicopters and also civil air transports and utility planes.

Highlight of the show will be the annual Allison, Bendix, General Electric and Thompson trophy flight events.

## Living in Space

Many companies along with the Department of Defense are investigating the problem of "keeping occupants of space ships alive." A flight to the moon will be made on some "tomorrow." Already experimental planes with pilots have reached the much rarefied air at 15 miles above the earth. Chuck Yeager of Bell X-1 fame and Bill Bridgeman who flew the Douglas Skyrocket to record heights and speed required special pressure suits, oxygen, and had to learn a new breathing technique.

But flying in outer space will present many more problems than they experienced. Not only will oxygen and pressurized air conditioning be required but carbon dioxide from exhaled air must be absorbed, the temperature must be carefully controlled, humidity regulated and cabin pressure rigidly maintained. Some automatic sealer for the cabin of a space ship will be necessary in case of air leaks and occupants will have to breathe, eat and move around differently than the manner to which we are accustomed. There will be no gravity to hold things down, including the occupants.

Word comes from AiResearch Division of the Garrett Corp. that they are already preparing the kind of equipment that will be required for space ships. They are one of the foremost manufacturers of air conditioning and cabin pressurization equipment in the U. S. Their Mr. Frederick H. Green, assistant chief of preliminary design, recently spoke

of problems encountered in space flying before the Inglewood, California, 20-30 Club.

## U. S. Naval Air Turbine Laboratory

Nearing completion at West Trenton, New Jersey, is the new \$40 million laboratory for testing turbojet and turbo-propeller engines under simulated flight conditions. Facilities and components of the laboratory are now being tested preparatory to acceptance of the contractors' work. Formal dedication will probably take place within the next few months.

Equipment and buildings are being provided to test jet engines from sea level conditions to those encountered at an altitude of 65,000 ft, encompassing variations in atmospheric temperature, density and humidity and of velocities from subsonic to supersonic.

Primary buildings provide for a high-pressure blower wing, a test wing containing structures for one turbo-propeller test cell, two turbojet test cells and an altitude test chamber, and an exhaust blower wing. Auxiliary equipment includes a high-capacity pumping station, a water treatment plant, a 1,200,000 gallon reservoir, 12 cooling towers, a machine shop and electrical sub-station. The complete installation occupies 25 acres of a 78 acre Navy-owned tract of land which adjoins Mercer County Airport.

## Aircraft Engineering Team

A recent breakdown of the engineering team employed at one major U. S. Aircraft plant shows that the number of aeronautical engineers employed is less than the number of electrical or mechanical engineers. Of the 5759 comprising the engineering groups 30 per cent are mechanical engineers, 24 per cent are electrical engineers and 19 per cent aeronautical engineers. The remaining 27 per cent is composed of physicists, mathematicians, civil, chemical, industrial, ceramics, petroleum, architectural engineers, etc.

## Aircraft Production

Employment in the aircraft industry has dropped below 800,000, according to Admiral De Witt C. Ramsey (USN, Ret.), president of the Aircraft Industries Association, who recently addressed a meeting of the  
(Turn to page 77, please)





# *Synchro-Start* **AUTOMATIC** *Engine Controls*

**FULL PROTECTION ALL THE TIME  
YOUR ENGINE IS STARTING OR RUNNING!**

**AUTOMATICALLY CLOSES THE STARTING MOTOR CIRCUIT** from any remote source of control, such as manual switch, temperature, pressure, level, load, power failure, etc.

**INTERMITTENTLY CRANKS THE ENGINE** with "OFF" and "ON" periods of cranking until the engine starts.

**ALLOWS A CERTAIN LIMIT OF TIME FOR CRANKING** the engine to get it started, thus saving the battery and starting motor from damage.

**INSTANTLY BREAKS THE STARTING MOTOR CIRCUIT** when the engine fires.

**CONNECTS AND DISCONNECTS THE CIRCUITS** to ignition, fuel valves, chokes, magneto, throttle, solenoids, etc.

**SHUTS DOWN THE ENGINE** and cuts off the battery and ignition or fuel on diesels in case of an abnormal op-

erating condition, such as failure to start, failure of fuel supply, failure of ignition, failure of oil pressure, or overheating of cooling system. Any number of additional safety switches, such as overspeed, fuel supply, oil level, load, temperature, pressure, etc., may be added.

**CLOSES THE CIRCUITS FOR ALARM** and signals in case of engine failure. When an auxiliary standby engine is provided, this same circuit can be used for automatically starting this engine to take over in place of the one that failed.

**EMERGENCY SIGNALS AND ALARMS** remain "ON" until shut off by attendant, at which time the Control Set automatically RESETS itself for another start. Individual signals show cause of shutdown.

**ADDITIONAL TERMINALS** and indicating signals can be furnished for overspeed governor or any number of safety switches at a slight additional cost.

**SYNCHRO-START PRODUCTS, INC.**  
*Automatic Engine Control Equipment*  
**8151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS.**



(Right) Subject's car and frame of the huge centrifuge, and (below) subject seated in special swinging chair

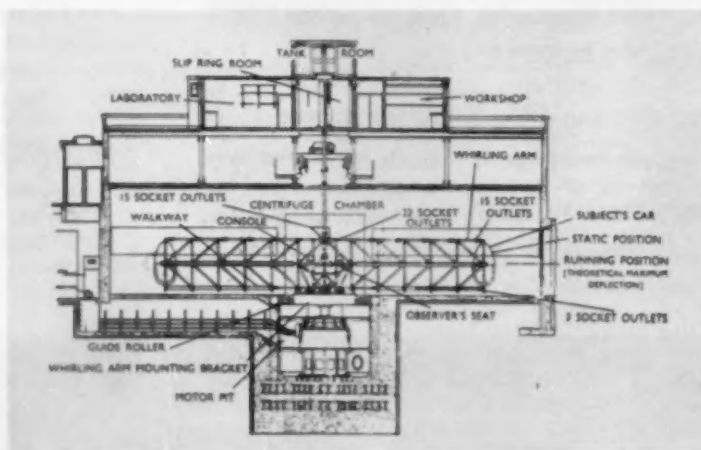


## HUGE CENTRIFUGE IN ENGLAND *Tests Pilots up to 30 G's*

A MAN-CARRYING centrifuge spins test pilots under laboratory conditions to simulate violent acceleration and deceleration of jet aircraft has recently been completed in England. A speed of 115 mph can be reached in nine seconds to assess the capacity of the human body to withstand forces of up to 30 g.

The 62-ft rotating arm is mounted on a 12-ton flywheel and driven by a 2200 hp electric motor. Subjects in the swinging cars can describe their sensations to observers seated at consoles near the hub. Electrodes are attached to different parts of their bodies to record physical reactions.

The \$1 million machine, the most modern of its type in Europe, was built for the R.A.F. Institute of Aviation Medicine at Farnborough, England, by M. B. Wild & Co. Ltd. General Electric Co. Ltd. supplied all the electrical plant and control equipment.



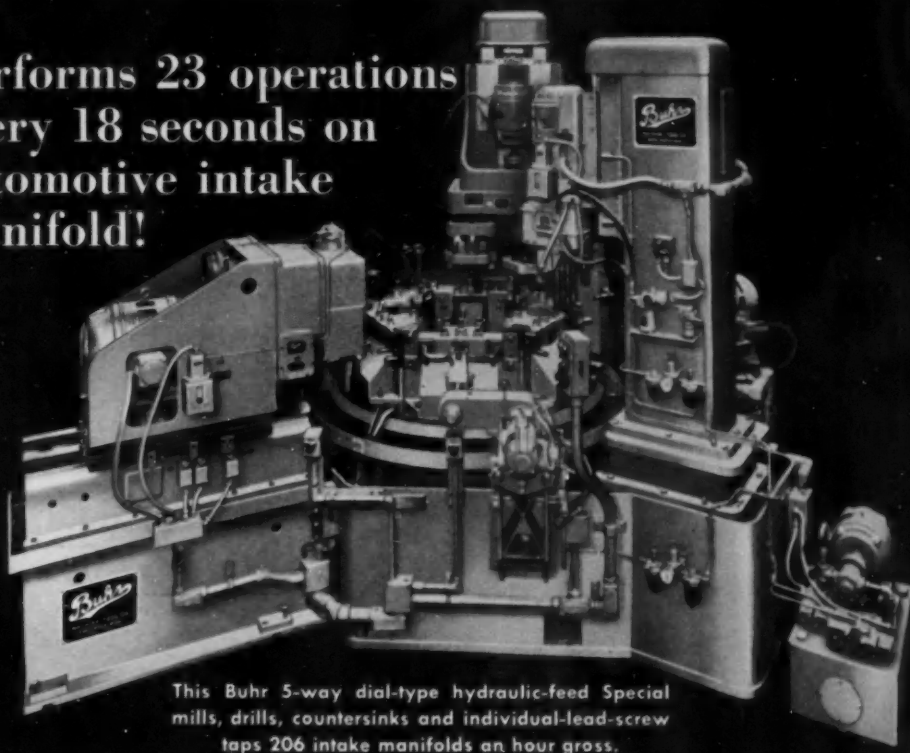
Details of construction of the new centrifuge

ANOTHER EXAMPLE of  
REDUCING COSTS WITH—

# Buhr

## ECONOMATION

Performs 23 operations  
every 18 seconds on  
automotive intake  
manifold!



This Buhr 5-way dial-type hydraulic-feed Special mills, drills, countersinks and individual-lead-screw taps 206 intake manifolds an hour gross.

The Machine is equipped with a Buhr 60"-diameter 6-position automatic index table, complete with shot bolt.

Chips are disposed automatically by means of a rotating chip conveyor.

Parts are loaded one per station in each of the six single-place fixtures. Power wrench with torque-control, automatically operates clamping mechanism.

Buhr's precision manufacturing methods provide complete interchangeability of all parts and component assemblies.



# Buhr

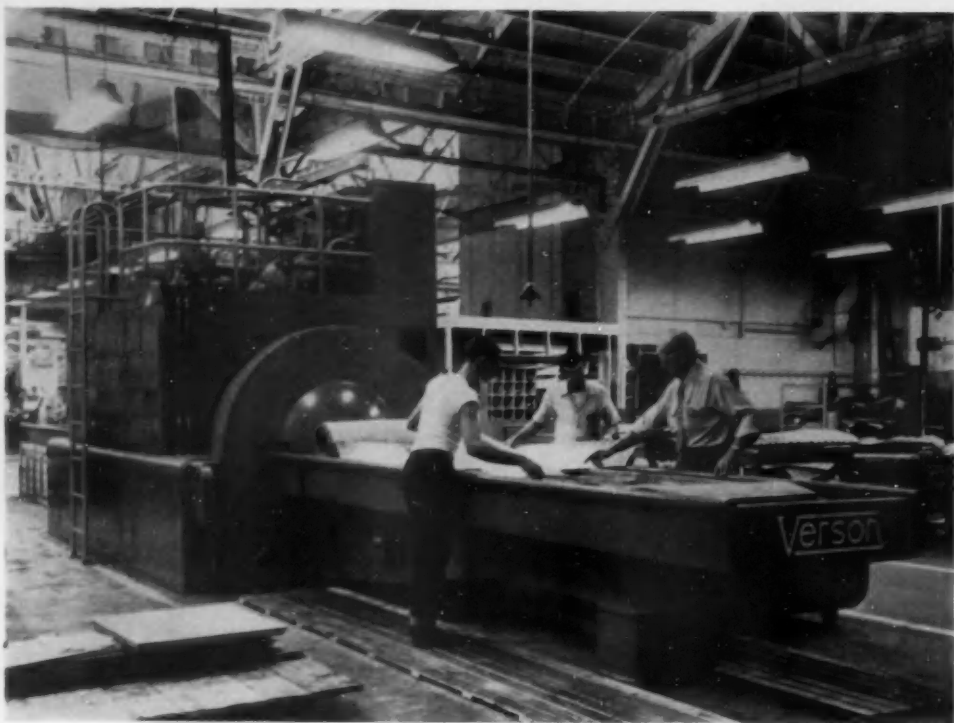
MULTIPLE-SPINDLE  
HIGH PRODUCTION MACHINERY

See what Buhr Economation can do to reduce your production costs. A phone call, wire or letter will bring you a prompt consultation with one of our top sales executives.

**BUHR MACHINE TOOL CO.**

ANN ARBOR, MICHIGAN

Solidly Engineered • Precision Built • for World's Leading Manufacturers



Verson-Wheelon high pressure Hydro Press

## Pressure Plates for Use with Hydro Form Blocks on Verson-Wheelon Press

**N**ORTHROP AIRCRAFT's sheet metal fabrication department, through development of pressure plates for use with hydro form blocks on a Verson-Wheelon high pressure hydro press, has achieved worth-while savings in time. By using the plates, which smooth out wrinkles caused in forming shrink flanges, it is possible to eliminate from 50 to 100 per cent of hand form bench time. The average time saved per part is four minutes.

A total of 43 form blocks have been equipped with this type of forming aid. The pressure plates are made in considerably less time than the old shrink

bar type forming aids. The tooling time required to make the pressure plates is one hour each, while the shrink bar type required 18 hours. The latter are not adaptable to the Verson-Wheelon press.

The Verson-Wheelon press exerts a pressing force of 19,440 tons, in its high pressure forming. It features a double shuttle working table arrangement, with each table measuring three by 12 ft. While one table is inside the pressing section, the other table can be loaded, ready to go into the chamber. This allows continuous operation without loss of time for loading between press operations.

### First Chinese Vehicle Plant To Make 30,000 Trucks Yearly

Communist China's first motor vehicle plant in Changchun is scheduled to produce 30,000 trucks annually by 1957. This target is included among other details of the Chinese five-year plan which have recently been disclosed by the State Planning Commission.

It is also stated that construction

of a second motor factory with a yearly output of 60,000 vehicles will start soon. A third plant to make 54-hp Diesel tractors at the rate of 15,000 units a year will become op-

erational during the next five-year plan beginning in 1958.

It is understood that 10,000 machine tools and other equipment made in China have now been installed in the Changchun factory. Machinery is also being supplied in considerable quantities by Russia, Czechoslovakia, Poland, and East Germany.



You can help us place a copy of this *new* book in your hands. Please give us your name and address. We'll do the rest. It will be *mailed* without cost to you—no intrusion on your time.

**Jones & Laughlin**  
STEEL CORPORATION — Pittsburgh

**J&L  
STEEL**

Jones & Laughlin Steel Corp., Dept. 430  
3 Gateway Center, Pittsburgh 30, Pa.

Please send me a copy of your new ELECTREAT booklet.

Name

Title

Company

Address

"One day we were using

14 hand sprayers  
...the next day, 2

"One day we were using

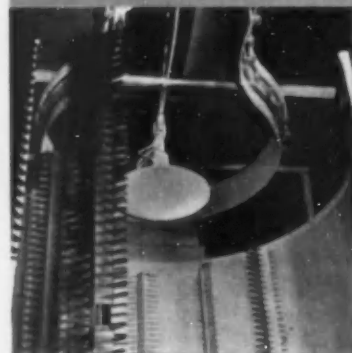
180 gallons of paint  
...the next day, 75

"Fantastic?" Not exactly. It's a typical, on-the-job-example of the savings made possible with the

### RANSBURG NO. 2 PROCESS

### Electrostatic Spray Painting

And, in this instance\* production was increased; quality of the work improved, and rejections cut to practically nothing.



\* Fluorescent Fixtures of California, in their modern plant in South San Francisco, uses the Ransburg No. 2 Process Reciprocating Disc Atomizer to paint their popular line of ALL-BRITE lighting fixtures. The quotes above are from Works Manager, R. H. Shaffer.

Regardless of the type of product you manufacture, if it's painted... and, if your production justifies conveyorized painting, you should look into the savings (and improved quality) which can be yours with one of the Ransburg Electrostatic Painting Processes. May we tell you about complete Ransburg services?

Write to Dept. A

*Ransburg*

ELECTRO-COATING CORP.

Indianapolis 7, Indiana



## News of the MACHINERY INDUSTRIES

(Continued from page 79)

located closest to the discharge end. The oven carriers accommodate two core assemblies in line with each other. Whenever the oven carriers are in a position to receive a load and there are assemblies waiting in the idle station, the transverse mechanism will push them into the oven loading station regardless of whether there are assemblies waiting on the roller conveyor to be taken into the idle station or not. In the latter case, the transverse motion will take place without the booster motion needed to hoist the assemblies off the rollers. Thus, the roller conveyor will be in condition to transport assemblies to their respective stations even while the transverse motion is in progress.

### Van Norman Buys Super

Super Tool Co., Detroit, has been purchased by Van Norman Co., Springfield, Mass. A manufacturer of carbide cutting tools, Super Tool operates, in addition to the Detroit plant, a 20,000 sq ft unit in Elk Rapids, Mich. Purchase price was not disclosed.

### Clearing to Spend \$3 Million

Clearing Machine Corp. has announced that it will spend \$3 million on an expansion program which will include a new 61,000 sq ft building adjacent to the Chicago plant. The company will also purchase new machinery to equip the facility.

### Surface Wear

At the recent semi-annual meeting of the American Society of Mechanical Engineers in Boston, it was reported that the radioactivation of surface has been successfully used in the evaluation of wear produced by friction between rubbing surfaces during periods of service. B. J. Jaoul, of Ecole National Supérieure des Mines de Paris, who reported the development, stated that the method enabled study of wear under severe service conditions, where the temperature of steel billets may be as high as 2400 F, and pressure on the die is about 140,000 psi.

**AUTOMOTIVE INDUSTRIES  
KEEPS YOU INFORMED**



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THE  
MACHINE TOOL  
SHOW

CHICAGO, ILL.  
SEPT. 6-17, 1955

INTERNATIONAL AMPHITHEATRE



don't miss the

# ALL-STAR PERFORMANCE

SEE THE

## Potter & Johnston Automatic Turret Lathes IN ACTION!



### THE 3-U AUTOMATIC

... the right machine to produce  
small, precision parts faster, better.

THE 4-U AUTOMATIC... extra power to take full advantage of  
faster-cutting carbide tooling.

...and the 6DRE-40... real productive  
power (40 hp) for lower unit cost on really  
tough jobs.

SEE FOR YOURSELF...



how these designed-for-  
tomorrow machines can help  
you build greater productive  
efficiency today!

**POTTER & JOHNSTON Co.**

PAWTUCKET, RHODE ISLAND  
SUBSIDIARY OF

**PRATT & WHITNEY**

DIVISION MILES - BEMENT - POND COMPANY

PRECISION PRODUCTION TOOLING



FOR MORE THAN FIFTY YEARS



## BUSINESS PULSE

(Continued from page 96)

cance. In both May and June the Federal Reserve Board's seasonally adjusted index pushed ahead to new all-time highs. Yet this in itself was less significant than the manner in which the monthly increases were effected. Whereas in the earlier phases of the upswing advances in output were traceable very largely to the gains in steel, automobiles and the

building trades, in both May and June the increases in over-all output resulted from diversified improvement in a wide range of other industries. As a matter of fact, in June the steel and automobile industries actually suffered moderately curtailed operations, owing mainly to temporary work stoppages associated with labor-contract negotiations. Thus, by the final month of the second quarter it had come to pass that the sum total of industrial production was advancing in spite of backsliding on the part of two of the three industries that

comprised the original stimuli. In other words, by June there was pretty strong confirmation that the upswing was broadly grounded. If this is so, it would seem to be a strong indication that a continuing uptrend in over-all activity is a distinct possibility—even though steel, automobiles and construction collectively show little promise of appreciable short-term gains.

## Retail Sales Extend Uptrend

Retail trade data also convey an impression of diversified strength in the economy. Total sales of retail stores in June were \$15.6 billion, approximately the same as in May on a seasonally adjusted basis and some six per cent above June a year ago. Bigger automobile sales were the most important factor in the year-to-year rise, but almost every division of trade has made some contribution to the improvement. What was particularly heartening toward the end of the second quarter was that sales of non-durables and also of durables other than automobiles seemed to be extending an uptrend that had got under way earlier in the year. Scattered July reports suggest, moreover, that this favorable pattern has continued.

There are a number of additional indications of economic strength. Conditions in the labor market showed further improvement between May and June. In that monthly period, total civilian employment rose by 1.3 million to a new record of 64 million. The increase reflected seasonal expansion in most activities plus a larger upswing than usual in manufacturing employment. With regard to the other side of the labor picture, the number of unemployed workers increased by 200,000 to 2.7 million between early May and early June, one of the smallest rises for this time of year in the postwar era. The persisting decline in unemployment among adult workers offset in part the addition of almost 400,000 young job seekers. Especially significant was the further reduction in the number of relatively long-term jobless. In June some 200,000 fewer had been out of work for 15 weeks or longer than there had been a month earlier.

## New Orders Plentiful

Manufacturers' order experience also has been very favorable. Sales reached a new high after seasonal adjustment in May, the latest month for which reliable data are available,

(Turn to page 113, please)

## A Commanding Signal... DAY OR NIGHT



Of all the signals devised for general automotive use, nothing is so commanding, so safe as the flashing light. . . And the heart of the directional signal system is the Tung-Sol Flasher.

In addition to the blinking action, the Tung-Sol

Flasher provides for an instrument panel pilot light. And the audible "tick-tick-tick" which is purposely built into the flasher further assures the driver that his signals are working.

More than 25 million Tung-Sol Flashers have been installed by car manufacturers since 1939. Rarely replaced, the Tung-Sol Flasher combines high performance with low installation costs.

Wherever a signal light is employed, a Tung-Sol Flasher will make it more commanding. Tung-Sol Electric Inc., Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Columbus, Culver City, Dallas, Denver, Detroit, Montreal (Canada), Newark, Philadelphia, Seattle.

## TUNG-SOL

## AUTO LAMPS · SIGNAL FLASHERS



# **RB&W FASTENER BRIEFS**

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



## *Technical-ities*

By John S. Davey

### **Coarse Threads Better Than Fine For Many Jobs**

The load and stress concentrations on threads are lower in standard coarse thread fasteners than in fine threaded ones. Flank engagement is also greater because coarse threads are deeper. Except in such cases where fine adjustments are needed, coarse threads are, therefore, preferable to fine threads. They have greater resistance to stripping and, consequently, can be more highly torqued to make a stronger assembly.

#### **PRODUCTION SAVINGS**

Coarse thread fasteners tighten with only two-thirds the revolutions needed for fine threads. So your assembly time is faster, too. Coarse thread bolts enter nuts or mating holes with less tendency to cross thread when not truly positioned. In hard-to-reach areas, this ease of starting can often be your deciding factor. Bear in mind, too, that coarse threads need less "babying" in handling since they're less apt to be damaged.

All in all, coarse threaded standard fasteners prove best for an assembly because of their additional clamping strength—and best for the assembler because of their extra economy and production advantages.

## **Spin-Lock screws increase holding power by 20%**

EXPERIENCE confirms that Spin-Lock screws hold tight under conditions of vibration or repeated heating and cooling. Their strong teeth have a ratchet action on the bearing surface—the acute angle lets the screw tighten fast and easily, until the teeth actually embed into the seat upon tightening, as shown in the sectional photomicrograph below. The almost vertical face of the teeth then resists counter-rotation and loosening. As a result, it takes about 20%

more torque to loosen a Spin-Lock than to tighten it.

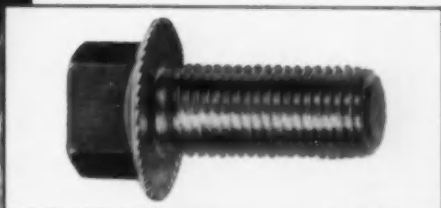
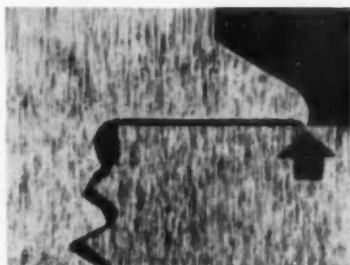
#### **LOWER COST ASSEMBLY**

Spin-Lock screws avoid need for washers or external locking devices. One-piece construction, they allow faster assembly and can be easily handled and driven in cramped spaces.

#### **STRONGER ASSEMBLY**

Heat treatment gives the teeth hardness and toughness. Spin-Lock screws can, therefore, be reused when removed with but slight loss in holding power. The extra strength also permits tighter fastening for a stronger assembly without risk of stripping threads.

Screws with hex, pan, truss and flat heads are available. See Sweet's Product Designers file or write Russell, Burdsall & Ward Bolt and Nut Company. Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.



## **High strength bolts improved product at a saving**

A mechanical vibrating shaker naturally suffers severe abuse itself from vibration. One manufacturer of such machines used costly special fasteners and lock nuts to control tendency of the product to loosen up.

Asked about it, RB&W recommended a standard high strength bolt, heavy nut, and two hardened washers. These

permitted a high tensile clamping force to be developed. Residual tension was ample for the most severe operating conditions and kept the bolts tight. Result: A 25% saving in annual fastener cost, the constant availability of standard items, and less maintenance for the product. You too can draw on RB&W experience for technical help to assure a strong assembly and to cut costs.

# WEAN EQUIPMENT CORPORATION

22800 LAKELAND BOULEVARD

CLEVELAND-17-OHIO

REPLY TO  
22800 LAKELAND BLVD  
CLEVELAND 17, OHIO

WARREN OFFICE  
347 N. PARK AVENUE  
WARREN, OHIO

## A letter of interest to Every Press User!

Dear Sir:

During the last year our company has developed a new press of revolutionary design.

We have conducted a series of tests on this machine which has been witnessed by a large group of press experts.

The net impression of these people seems to indicate that our development may preface sweeping changes in the whole field of metal stamping.

It was our original intention to restrict the application of this press to certain specialized industrial fields, but it is now apparent that it has the broadest possible application and the pressure to release general information regarding its performance has been overwhelming.

We, therefore, use this open letter as an invitation to authorized personnel to see this machine in operation.

If you will express your desire in letter form on company stationery, it will receive our prompt attention.

Very truly yours,

WEAN EQUIPMENT CORPORATION

*R. J. Wean, Jr.*  
R. J. Wean, Jr.  
President



Designed primarily for speed of operation, the Wean Flying Press is the first machine of its kind to successfully combine the fast operating advantages of continuously fed strip with dies which move with the strip.

The press differs greatly from conventional machines. Machine tool-like in appearance, it has a minimum of vibration and requires

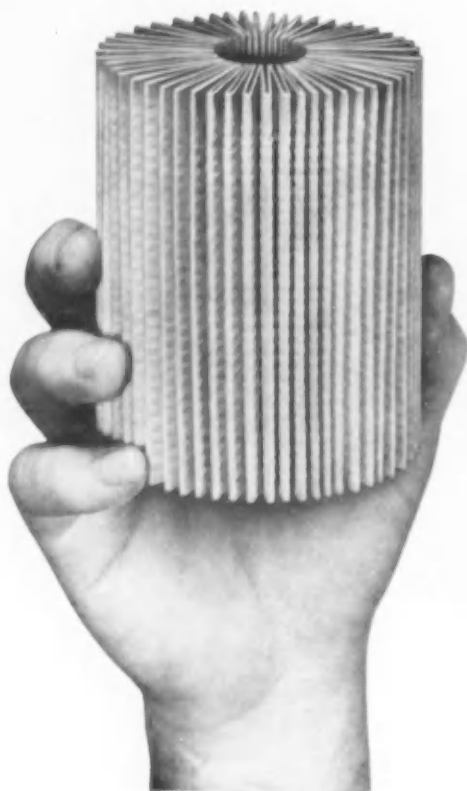
no foundation. In addition to its great speed, it incorporates several new design principles that should interest every press user.

An automatic adjustment of feed length while press is in motion, and the absence of a clutch and brake (the most frequent points of maintenance on conventional presses), are two examples of this advanced engineering.



*Wean 60-ton Flying Press stamping out automotive hinge plates at 600 pieces-per-minute, using the same die set which on a conventional press made the parts at a rate of but 90 pieces-per-minute.*

**Wean** EQUIPMENT CORPORATION Cleveland, Ohio  
Chicago Newark, N. J. Detroit



## Here's the secret of Micronic\* Purolator's HIGH FLOW RATE

This little Purolator filter element can clean a quart of dirty lube oil in 60 seconds. It takes out sludge and solid impurities as small as one micron (.000039-inch) yet leaves beneficial additives unaffected. It operates with minimum pressure drop and a standard-size oil pump.

You can see the secret at the left. It's the Purolator Micronic element. This accordion-pleated, resin-impregnated element provides ten times the filtering area of older elements. This means faster filtration rates and far greater dirt storage capacity.

To designers and users of automotive equipment, Micronic-type Purolators offer thorough filtration by a small, compact unit that fits snugly into the lubricating system without needing an oversized pump to boost pressures through the filter. These advantages of Micronic filtration

are among the many reasons why original automotive equipment manufacturers use more Purolators than any other type of filter.

Micronic elements do not channel. They are waterproof and warp-proof and remain unaffected by engine temperatures. There's a Purolator to fit every vehicle, tractor, and other gasoline- or diesel-engine-powered unit in service today. Write for our automotive catalog, No. 2054, to Purolator Products, Inc., Rahway, N. J., Dept. A3-816.

\*Registered Trade Mark





Chicago      Newark, N. J.      Denver

**modern design specifies stainless steel**

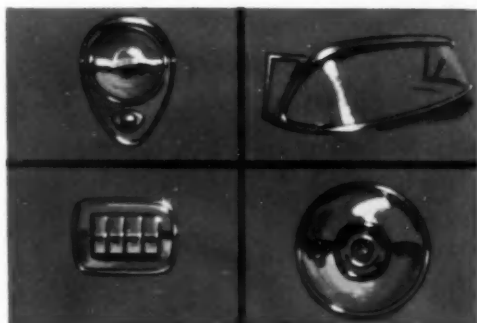


## **McLouth** *STAINLESS* **Steel**

### **for automobiles**

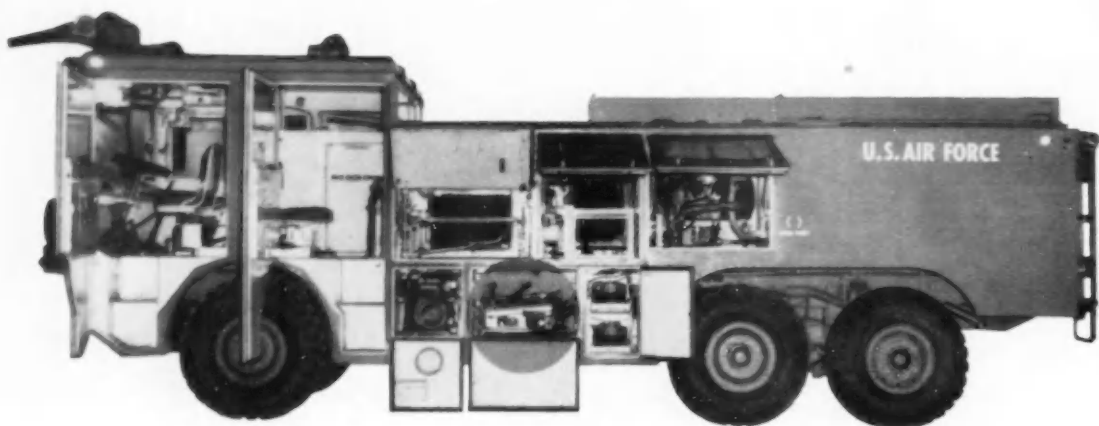
The beautiful bright molding and trim that style your car are made of non-corrosive, easy to clean Stainless Steel. Designers of automobiles and hundreds of other products specify Stainless Steel for its many valuable properties.

For the product you make today and the product you plan for tomorrow specify McLouth high quality sheet and strip Stainless Steel.



**McLouth STEEL CORPORATION**  
*Detroit, Michigan*

MANUFACTURERS OF STAINLESS AND CARBON STEELS



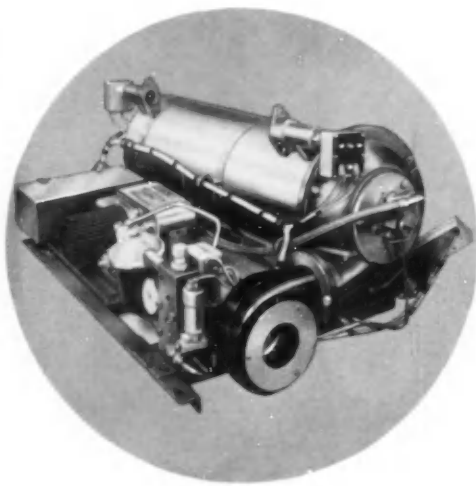
*everything has to work...and it does!*



Test personnel of the Air Proving Ground Command recently returned after more than 1000 hours of Operational Testing on the Type 0-11A USAF Crash Truck built by American-LaFrance-Foamite. A Janitrol 90,000 Btu/hr. Liquid Heater is standard equipment on this all-weather vehicle, and supplies all heating requirements.

No difficulties of any kind were experienced with the Janitrol heater in the 0-11A Crash Truck during the entire arctic test period. Not once was any service necessary! Defrosting of the windshield was adequate with the assistance of the wipers in combatting the after-squirt from the turret dispenser nozzles. In a minus 41 F ambient temperature cab comfortization was maintained at plus 66 F, and in addition the Janitrol Heating Unit provided standby heat for the vehicle engine, pump engine, hose reel compartments, battery compartment and auxiliary power generator compartment. The main water storage tank was protected from freezing by a heat exchanger submerged in the tank.

No matter what kind of heat you may need—specify "Janitrol" and be sure of performance and dependability.



**HEAT WHEREVER YOU WANT IT**



**Janitrol**

AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORP., COLUMBUS 16, OHIO

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna., 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.

## BUSINESS PULSE

(Continued from page 106)

and new orders were more plentiful than in any other month since January, 1951. Manufacturers' backlogs of unfilled orders also rose during May. These rising trends resulted mainly from the experience of heavy-goods producers, whose new orders advanced 12 per cent beyond the seasonally adjusted April rate. Their sales were up 4 per cent as shipments of all component industries increased.

Steel production dropped slightly in June and early July as the brief strike shutdowns affected rolling-mill schedules, but it is thought increasingly likely that steel demand will push production, in the latter months of the year, up to or even beyond the record output of the second quarter. It is reported that incoming business has been developing at a much faster pace than actual output for several weeks.

Automobile production, meanwhile, has continued at surprisingly high levels, considering the fact that the third quarter had been heralded as the period in which sharp cutbacks were expected. At this writing, it appears that production of new cars ran upwards of 670,000 units, a level which easily represents a new July record.

## BOOKS...

**AMERICA'S NEEDS AND RESOURCES: A NEW SURVEY**, by J. Frederic Dewhurst, published by Twentieth Century Fund, 330 W. 42nd St., New York 36, N. Y. Price, \$10.00. America now has the strongest, most productive economic system in human history, capable of attaining by 1960 a total national output of \$414 billion and making possible an average family income of more than \$6000 per year. Prospects of still greater growth in the years ahead are good. This is one of the central conclusions of the major economic study brought out by the Twentieth Century Fund. It is a completely revised and enlarged version of a study that originally appeared in 1947. The new volume accomplishes two purposes. It gives the present position of American economic resources, production and consumption. It establishes a basis of comparison with earlier figures and thus makes it possible to see with some clarity the extent of progress made.

**ASTM PROCEEDINGS**, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$12.00. This 1400-page volume records the technical accomplishments of the American Society for Testing Materials for the year 1954. It includes many technical reports and papers, together with discussion which was offered to the Society during the year and accepted for publication in the book.

AUTOMOTIVE INDUSTRIES, August 15, 1955

## FASTENER PROBLEM



Type LH2424, for temperatures to 550° F.



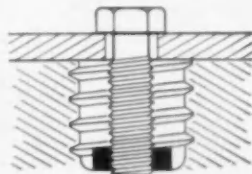
Type N2424, for temperatures to 250° F.

## Strong, self-locking threads for tapped holes in soft metals

Tapped holes in soft metals have long presented problems to equipment manufacturers. Threads wear rapidly, are easily damaged and are susceptible to stripping. Bushings made of harder alloys are a partial solution. Such inserts, however, have a tendency to shake loose under vibration, or to back out when the bolt is removed. The only alternative is to position them with a secondary fastening device, such as a key or a "Dutchman" pin, which then presents a difficult and costly service problem. To eliminate this, ESNA has developed a new bushing design. Type 2424 bushings are self-locking externally and internally. They provide a one-piece, vibration-proof steel threaded insert that will develop a tensile load of 140 M psi in the bolt, is dependably self-retaining, yet can be readily removed with simple tools.

Easily inserted in an NC-2 tapped hole, using simple tools, the type 2424 bushings are locked in place by the interference action of the patented Lok-Thred system, which reforms the socket thread to the equivalent of a perfect selective fit.

The internally-threaded sections use one of two thoroughly-proven ESNA self-locking devices. For temperatures up to 250° F., the new bushing is available with the famous red nylon locking collar. For service between 250° and 550° F., it comes equipped with the all-metal LH locking device that has been tested on many types of ESNA high temperature lock-nuts. Both bushings are available in sizes #10 through 1/2" and the locking devices provide performance and reusability per Specification AN-N-5b and AN-N-10a.



"Lok-Thred" contour displaces metal from crests of socket threads to produce equivalent of a perfect selective fit. Original socket threads can be reworked as many as ten times and new bushings inserted.

Type 2424 bushings can be installed in any material whose hardness is less than 25 Rockwell C, including aluminum, magnesium, plastic and mild steel castings. Simplified installation and field maintenance techniques save costs. And because Lok-Thred method of external locking creates less hoop stress in the base of the casting, edge distance or boss size is reduced . . . with resulting weight savings.

### MAIL COUPON FOR DESIGN INFORMATION

Elastic Stop Nut Corporation of America  
Dept. N81-85, 2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastener information:

☐ Details of type 2424 bushings.

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name \_\_\_\_\_

Title \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_



## Newest Equipment for Making FORD-O-MATIC TRANSMISSIONS

(Continued from page 61)

tion, the part is chucked on the OD previously rough turned. In this machine, the rear drum hub is rough faced along with the front face of the flange at the second station. The outside diameter of the flange and the outside diameter of the hub are rough turned while the pinion shaft bosses are finish faced and a 2 11/16 in. hole

is bored one-third through. In succeeding stations, the hole is bored through, and the part is semi-finish machined.

Again the workpiece is placed in a Bullard, this time a six-spindle unit. This machine roughs and semi-finishes the end of the carrier lugs, rear face of the flange, and outside diam-

eter. It finish bores a 2.680 in. hole.

Locating by means of the 2.680 in. hole and the lugs previously machined, the part is processed in a single-end, double-spindle Ex-Cell-O boring machine. Both spindles of the machine tool perform the same operation on the part—finish turn the outside diameter, finish face both sides of the flange and finish turn the hub diameter.

For the subsequent material removal phase, the carrier is loaded into a Baush 15-station automatic transfer machine. The part is located in a special fixture by means of the outside diameter of the flange and the front flange face. Seven stations in the unit perform milling operations, one station is used for drilling, two stations at the end of the line are for reaming, one for loading, and the remainder are idle stations. Progressive operations through the machine include milling the pinion pockets, end milling the rivet holes, chamfering the rivet holes and long pinion shaft holes, drilling short pinion shaft holes, long pinion shaft holes and rivet holes, chamfering pinion and rivet holes, end mill short pinion holes, and reaming all rivet, and long and short shaft pinion holes.

A Hoern & Dilts vertical index boring machine is utilized for the next operation of finish facing the tops of the three lugs and finishing the bottoms of the three deep and three shallow pinion pockets. Oil holes are then drilled with a Morris three-position automatic drilling machine. During the next phase, a 35-ton capacity Denison Multipress is utilized to stake over three rivets after assembling the planet cover to the rear drum.

A hole is then finish bored for a bushing and the outside of the hub is turned on a two-spindle E-Cell-O. For these operations a 10-in. diaphragm chuck is used on the machine. Another Ex-Cell-O is used to finish turn the large hub, finish bore the 2 11/16 in. hole and chamfer the inside diameter to a 60 deg included angle. A Heald Sizematic grinder receives the part for grinding the inner thrust face. A 10 in. diaphragm air operated chuck is used for the holding job. After another grinding operation, two eight-ton Denisons are used to press in two bushings. The bushings are precision bored in one spindle Ex-Cell-O equipment.

The final machining operation is performed by a four-spindle, two-station Ex-Cell-O boring machine. At the first station, the short and long pinion shaft holes are semi-finish

(Turn to page 118, please)



**LOWER THE  
BOOM ON COSTS  
SET RIVETS  
FAST**

2 at a time with the  
*Chicago*  
**"214"**

With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches two rivets. 14-inch throat accommodates large assemblies. Handles 5/64" diameter or smaller steel tubular rivets—lengths to 7/8". Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to versatility. For help with fastening problem... send sample assembly (or a blue print) for free fastening analysis.



**FREE CATALOG** contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

**Chicago Rivet & MACHINE CO.**

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

just **12** seconds from this to this



with the help of  
**AUTOMATION**  
by **LAPOINTE**  
**BROACHING**

A PARKING BRAKE PAWL forging is straddle-broached to form a straight-sided tooth on one edge and a slot on the opposite side . . . and then 2 holes are drilled and reamed at close tolerances with relation to broached surfaces . . . at a production rate, for the finished part, of

**300 PER HOUR**

**AT 80% EFFICIENCY!**

This Lapointe 10 ton, 54-inch stroke Single Ram Vertical Broaching Machine is equipped with an automatic indexing fixture. Parts are progressively moved in pairs through 6 double-stations, and the broaching, drilling, and reaming operations are done simultaneously but on separate pawls.

If you wish to know more about increasing your production through broaching,

write for our Bulletin SRV-10.

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MACHINE TOOL  
SHOW  
CHICAGO, ILL.  
SEPT. 6-17, 1955  
INTERNATIONAL AUTO-EXHIBITION



See it  
in action!  
Booth 707



THE **LAPOINTE** MACHINE TOOL COMPANY

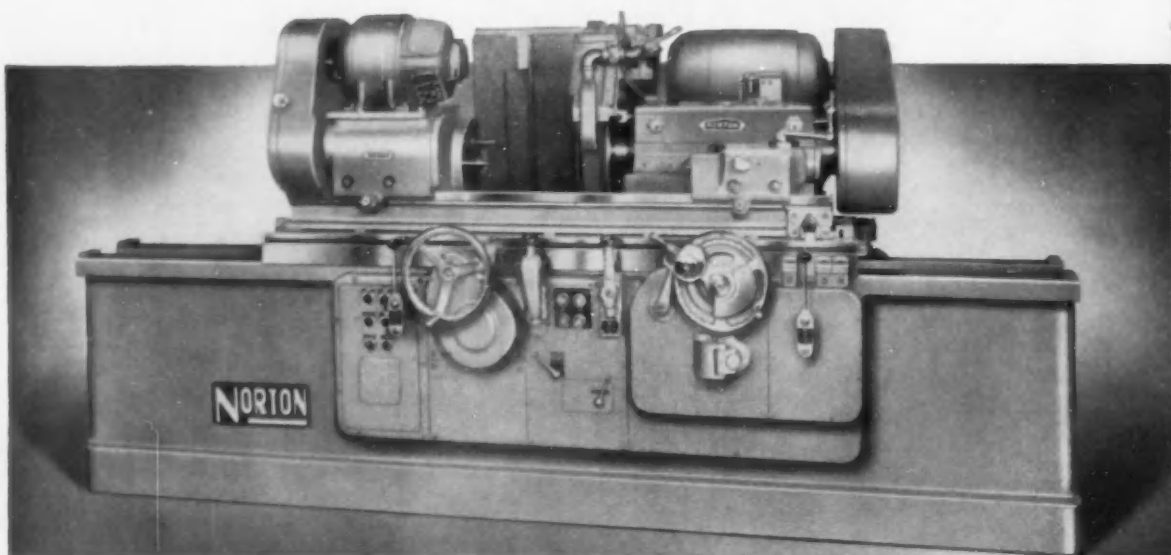
HUDSON, MASSACHUSETTS • U. S. A.  
In England: Watford, Hertfordshire



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



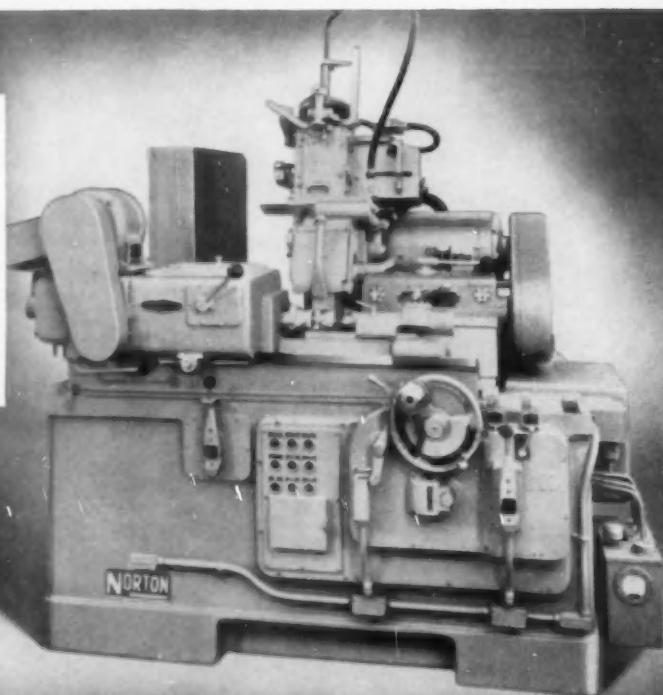
# 6 from the world's most



○ *Norton General Purpose Production Type Cylindrical Grinders.* The 10" x 36" Type CTU Semi-automatic, a top performer among grinding machines of this type, offers a unique combination of speed, accuracy, flexibility and sturdiness. One-lever control of the auto-

matic grinding cycle reduces operator's duties to loading and unloading. Production line and job shop users report Norton 10" CTU's have doubled production, replaced several machines, eliminated extra operations. Write for Catalog 1787.

○ *Norton Special Purpose Grinders For Automotive Parts* include the 6" x 8" Semi-automatic Piston Grinding Machine, outstanding for high production and high precision. Fast sizing, automatic wheel truing and simplified operation are among the many advanced features. Work drive arrangements available for all types of piston relief grinding. Catalog 742 gives full details.



# complete line of

money-saving  
grinders and  
lappers



○ **Norton Surface Grinders** are well represented by this 8" x 24" Hydraulic Grinder. Designed with both hand and power table traverse and cross feed, it produces plane surfaces smoothly and speedily. Convenient controls and easy accessibility keep operating and maintenance times low. Extra equipment, such as magnetic chucks, wet grinding attachment and individual dust exhaust system meet all operating conditions. Write for Catalog 190.



○ **Norton Tool Room Cutter Grinders.** The No. 20 Cutter and Tool Grinder is the most versatile machine in its class. The wheel head tilts up to 15° above or below horizontal, and may be swivelled through 360° — simplifying such jobs as grinding taper reamers, step counterbores, form tools and milling cutters. Other pace-setting advantages include long table traverse and wheel slide travel . . . integral motor spindle . . . wheel slide graduated dials readable from any angle. No other cutter and tool grinder does so many jobs so fast, so easily. Catalog 189 tells you why.



○ **Norton Lapping Machines.** The Type 16FC Vertical Lapper brings you outstanding production capacity

for such work as diesel injector parts, plug gages, size blocks, sides of small bearing races, pump gears and plates and many other parts. Laps flat work up to 3" x 5", and cylindrical work up to 3" diameter, producing a high degree of accuracy and finish. Catalog 212 gives you details.

Only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost.

The six machines shown here are typical products of that experience — bringing you ahead-of-the-parade design that speeds production and adds maximum product-value on every job they do for you.

But remember — these six advanced machines represent only a small fraction of the world's broadest line. Besides many models of cylindrical, surface, crankshaft and camshaft grinding machines, Norton produces a wide range of lapping machines, tool room grinders and special types for grinding pistons, valves, jet parts, etc.

A new illustrated folder #1843 lists the entire Norton line of grinding and lapping machines and tells you how to get all the facts on each unit. For your copy, write to NORTON COMPANY, Machine Division, Worcester 6, Mass. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

To Economize, Modernize With NEW



**GRINDERS and LAPPERS**

*Making better products . . . to make other products better*

District Sales Offices: Worcester • Hartford • New York  
Cleveland • Chicago • Detroit



○ **Norton 10" Universal Grinders.** The 10" x 20" Universal Grinder has the flexibility to handle an almost endless variety of jobs. Compound swivel arrangement of wheel head enables you to make separate angular settings of wheel and feed. External, internal, face or angular wheel slide operations are easy. Chuck may be mounted on one end of work head spindle, ready for use by turning head 180°. Write for Catalog 170.

(Continued from page 114)

bored; these holes are then finished at the second station. A Sheffield Precisionaire is used to inspect the pinion holes.

Gisholt equipment has been installed in the plant for statically balancing the carrier assembly. After balancing, the rear drum and planet cover assembly is placed in a Gisholt Superfinisher for polishing the large hub diameter. Sheffield air gaging equipment along with various types of mechanical gages are used for the final inspection of the carrier assembly.

## New Defense Facilities

**S**UPPLEMENTING the list of Certificates of Necessity issued up to June 1, 1955, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the July 15 issue, page 168 of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Office of Defense Mobilization, covering the period which extends

from June 2 to July 13, inclusive.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

**AEROJET-GENERAL CORP.**, Sacramento County, Calif.  
Research and development facilities—\$6,525,800 (70)

**BELL AIRCRAFT CORP.**, Wheatfield, N. Y.  
Military aircraft—\$426,947 (65)

**BOEING AIRPLANE COMPANY**, Seattle, Wash.  
Military aircraft—\$404,925 (65)

**CURTISS-WRIGHT CORP.**, Propeller Div., Caldwell, N. J.  
Military aircraft parts—\$96,513 (65)

**CURTISS-WRIGHT CORP.**, Wright Aeronautical Div., Wood-Ridge, N. J.  
Research and development—military aircraft—\$2,122,000 (60)

**GOODYEAR AIRCRAFT CORP.**, Akron, Ohio  
Military aircraft parts—\$200,785 (65)

**LOCKHEED AIRCRAFT CORP.**, Burbank, Calif.  
Military aircraft—\$527,938 (65)  
Military aircraft—\$100,109 (65)

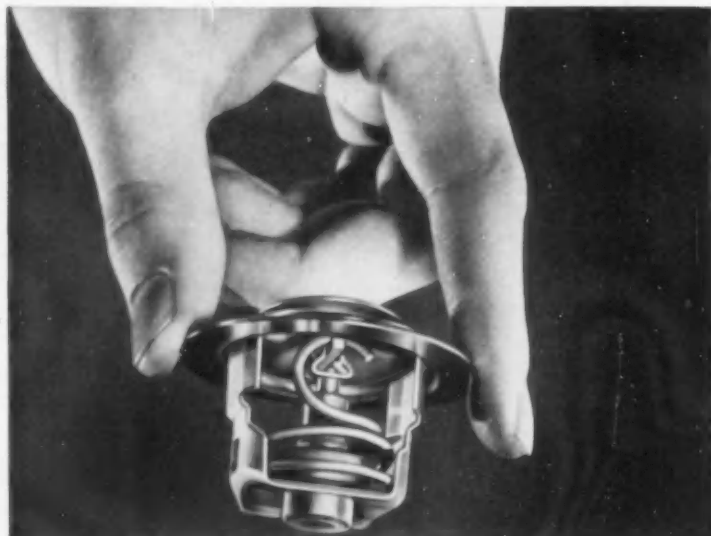
**LOCKHEED AIRCRAFT CORP.**, Missile Systems Div., Van Nuys, Calif.  
Research and development—guided missiles—\$1,628,937 (60)

**ROHR AIRCRAFT CORP.**, Chula Vista, Calif.  
Military aircraft parts—\$542,476 (65)

**UNITED AIRCRAFT CORP.**, Pratt & Whitney Aircraft Division, East Hartford, Conn.  
Military aircraft engines—\$503,000 (65)

**THE UNITED TOOL & DIE COMPANY**, West Hartford, Conn.  
Military aircraft engine components—\$99,877 (65)

**UTILITY METAL PRODUCTS, INC.**, Pasadena, Calif.  
Military aircraft parts—\$503,259 (55)



## DOLE DV THERMOSTATS

the accurate temperature control for modern engines

Highly developed for positive operation against the increased pump pressures in sealed cooling systems, and with all types of antifreeze solutions. Helps maintain best engine performance—speeds warm-up—saves gasoline and oil—reduces wear. Gets more heat from the car heater.

Now standard equipment on thirty-four (34) leading makes of cars, trucks, tractors, commercial vehicles, industrial and marine engines.

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## More Defense Contract Awards

**ACF INDUSTRIES, INC.**, New York, N. Y.  
Facilities for the manufacture of carriage, motor, 105 mm. Howitzer, T98E1, gun, twin 40 mm self-propelled, T141, shell, HE, 8 in., M106 and shell, HE, 8 in. M106—\$6,224,383

**ACTIVE GEAR COMPANY, INC.**, Chicago, Ill.  
Vehicle parts—16,439—\$125,560  
Gear set, differential—413 ea.—\$50,613

**AERO DESIGN & ENGINEERING CO.**, Tulakes, Ohio.  
AF Model L-26B airplanes—\$1,178,623

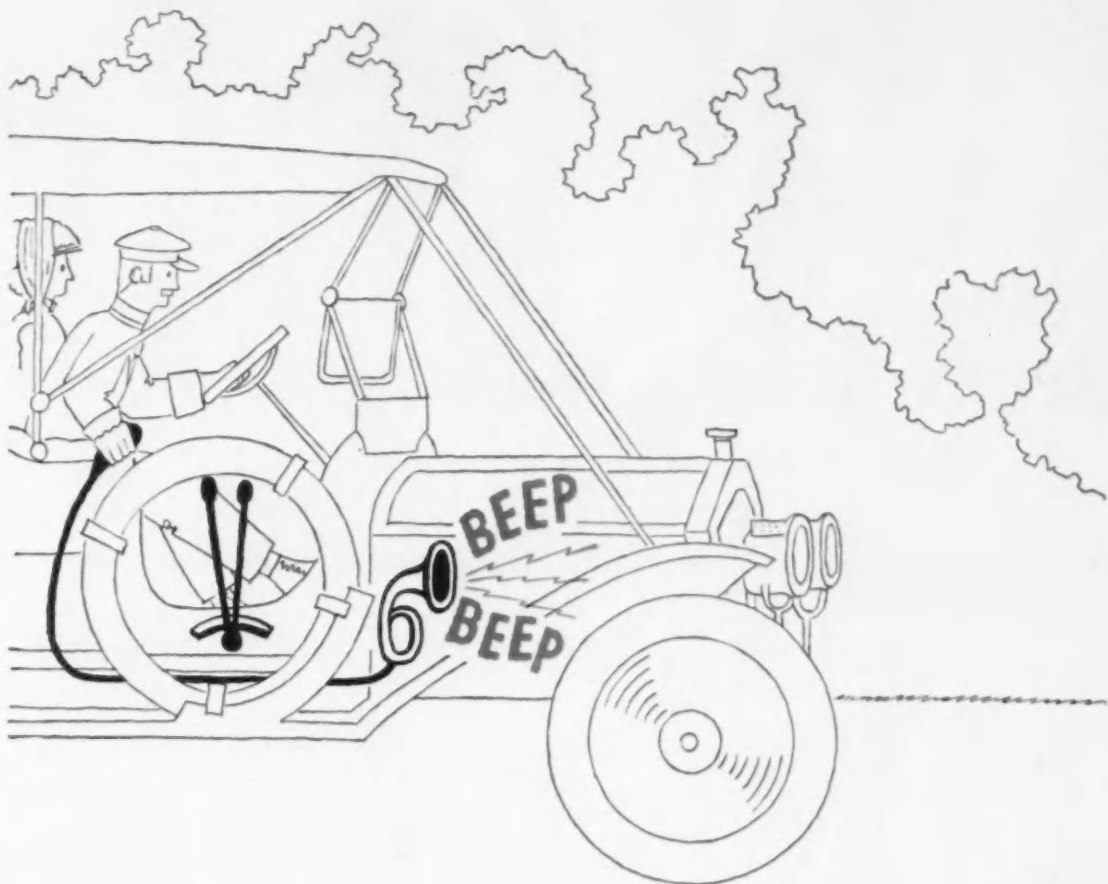
**AEROJET-GENERAL CORP.**, Azusa, Calif.  
Rocket engine—90 ea.—\$85,500

**AIRBORNE ACCESSORIES CORP.**, Hillside, N. J.  
Spare parts—7570—\$130,028.39

**ALLIED PRECISION INDUSTRIES, INC.**, Geneva, Ill.  
Vehicle parts—8,384—\$31,227

**ALLIS CHALMERS MFG. CO.**, West Allis, Wis.  
Tractor, full tracked—3 ea.—\$63,903

(Turn to page 122, please)



Now there was a car horn . . . and when a red-blooded American boy, out riding with his girl, squeezed the bulb, he said, "I like the sound of that horn." But his lady love said, "It jangles my nerves."

So automobile manufacturers (who are red-blooded American boys themselves) changed the horn. And that's the way it's gone over the years.

Automobile manufacturers have introduced automatic transmissions, power steering, wrap-around windshields, and power brakes . . . style conscious, safety conscious women voiced their approval and went along with their husbands to help pick out the new car.

And today, women have indicated that driving would be even more pleasant with safer brakes. That's why we are certain that in the very near future you'll be driving a car equipped with Auto Specialties Double-Disc Brakes. Auto Specialties Double-Disc Brakes are designed to easily control today's more powerful cars. They make driving safer, drivers surer of their brakes. Auto Specialties Double-Disc Brakes are the most modern power brakes built. The extra power for braking is built right into the brakes themselves . . . they stop you more smoothly, more quickly, more gently. They have passed the severe braking tests of leading car factories. They're safer brakes and their adoption will be another step forward in the automotive industries' aim toward making driving more pleasant and safer for you, your wife and your family.

A 16-page, 4-color book, "The Stopping Story," gives detailed information about these brakes. It's free. Write for it to

## **AUTO SPECIALTIES MFG. CO., INC.**

### **SAINT JOSEPH, MICHIGAN**

Plants also at Benton Harbor and Hartford, Mich., and Windsor, Ont., Canada.  
Manufacturing for the automotive and farm machinery industry since 1908.

# NEW

## FRONT-TO-BACK CRANKSHAFT DESIGN



embraces numerous operating and structural improvements

Of far reaching importance, the development of Niagara's impressive, new Styleline Deep Throat Presses has opened the way to numerous operating and structural advantages. Barriers imposed by conventional side-to-side crankshaft arrangements and outmoded end wheel designs have been shattered. The Niagara-developed front-to-back crankshaft design introduces a new concept of deep throat press performance and economics:

### MODERN, SPACE-SAVING, ENCLOSED CONSTRUCTION

The entire driving mechanism is within the limits of a compact, all-steel frame. There are no exposed, overhanging parts and mechanisms to obstruct crane service, block light, throw grease and consume floor space unnecessarily.

### LONGER DIE LIFE, GREATER ACCURACY

Increased distance between gibs makes possible a wider slide (left to right) for greater support to wide dies. Longer gibs assure accuracy for the full stroke.

### MINIMIZED SHAFT DEFLECTION AND GEAR WEAR

With all gears located inside the press frame and overhung bearings eliminated, damaging shaft deflection is held to a new minimum. Both

pinion and gear are more rigidly supported to withstand maximum loading with minimum wear.

### PROLONGED GEAR AND CLUTCH LIFE

Gears and clutch members, all neatly housed in the crown, operate in sealed baths of oil to assure longer service life.

Built in a large range of sizes and throat depths, these modern, Styleline Series C Presses reflect the latest thinking of Niagara engineers ... today as always, pace-setters in power press advancement.

### HERE'S THE WHOLE STORY ON WHAT THESE MACHINES CAN DO FOR YOU

Get all of the facts. Check the specs! Write for new, illustrated Bulletin 61 today. It will be mailed promptly without obligation.



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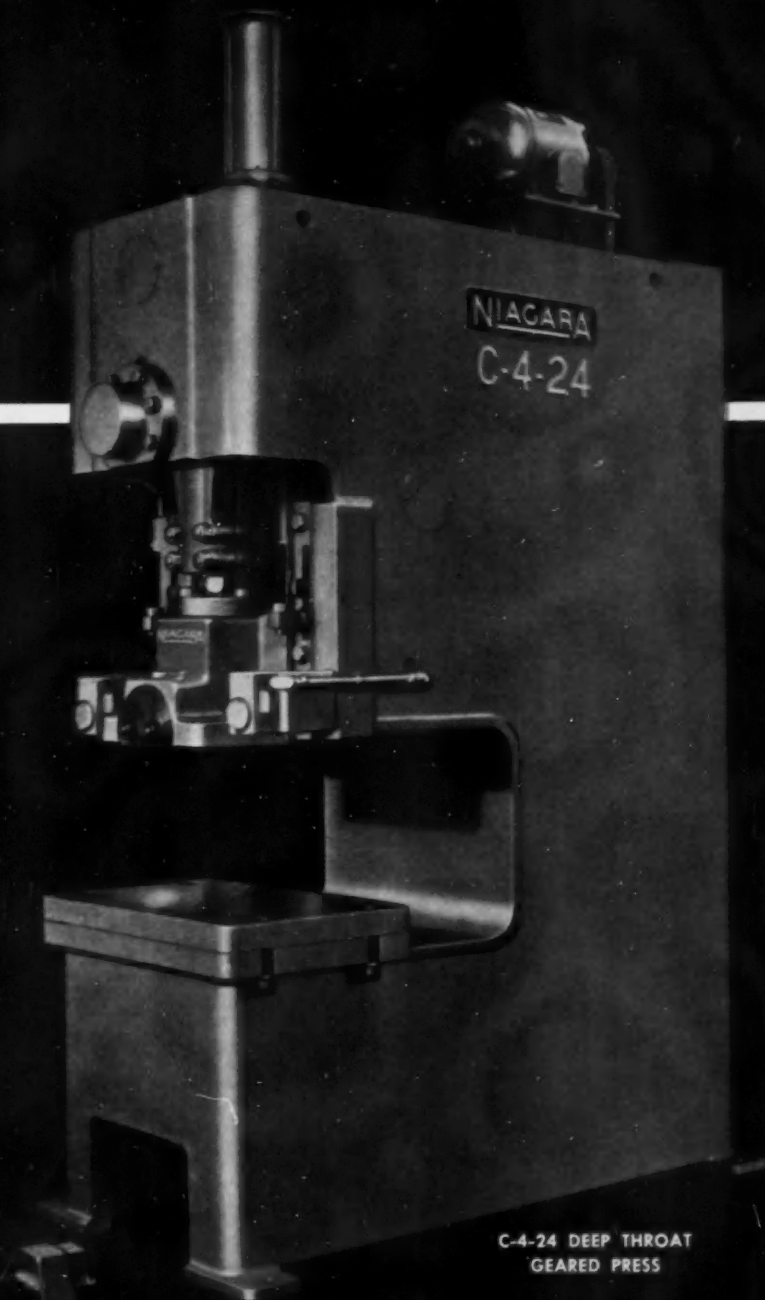
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# NIAGARA

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work





C-4-24 DEEP THROAT  
GEARED PRESS

Air counterbalance offsets weight of slide, die and connections.

No overhanging motor, belts, flywheel, brake, shafts nor other mechanisms.

Front-to-back crankshaft (heavy, forged, high carbon steel) enables fully stylelined, enclosed construction.

Multiple V-Gibs assure maximum die life.

Unusually long slide and stiff channel section eliminate deflection of guiding ways, increasing die life. (J.I.C. flanged slides available.)

Large range of throat depths accommodates tremendous variety of work.

Rugged, all-steel, box type frames stress relieved in a furnace and grit blasted before machining.

Foot switch optionally available for clutch control.

Readily equipped with pneumatic die cushions for drawing operations.

Exclusive electro-pneumatic clutch on all geared models. Famous mechanical sleeve clutch on all plain, non-geared models.

# STYLELINE DEEP THROAT PRESSES

(Continued from page 118)

**ALUMINUM COMPANY OF AMERICA,**  
Pittsburgh, Pa.  
Facilities for the production of aluminum  
plate—\$5,700,000

**AMERICAN BRAKE SHOE CO.,** Kellogg  
Div., Rochester, N. Y.  
Compressor, gasoline engine driven—2;  
482 ea.—\$643,095

**AMERICAN CHAIN AND CABLE CO.,**  
INC., York, Pa.  
Repair parts—15,000—\$164,650

**AMERICAN-LaFRANCE FOAMITE CORP.,**  
Elmira, N. Y.  
Truck, fire—16 ea.—\$171,654

**AMERICAN STEEL DREDGE CO., INC.,**  
Wayne Shovel and Crane Div., Ft.  
Wayne, Ind.

Crane, truck mounted—1 ea.—\$26,808  
**ARTISAN ELECTRONICS CORP.,** New  
York, N. Y.

Tank parts—8832—\$119,232  
**AUTOMATIC TRANSPORTATION CO.,**  
Chicago, Ill.

Trucks, forklift—18 ea.—\$95,635.80  
**AVCO MFG. CORP.,** Crosley Div., Cincin-  
nati, Ohio

MD-1 fire control systems—61—\$5,409.  
065  
Maintenance tools and test equipment—  
lot  
Spare parts—various—\$1,819,954

**BAKER TRAILER & BODY CO.,** St. Louis,  
Mo.

Vehicles—25 ea.—\$61,643  
**THE BAKER-RAULANG CO.,** Cleveland,  
Ohio

Truck, fork, electric—9 ea.—\$39,331  
Repair parts—4 lots  
Trucks, forklift—4 ea.—\$12,003

**BEECH AIRCRAFT CORP.,** Wichita, Kan.  
Utility-command aircraft study—job—  
\$47,910.52

**BELL AIRCRAFT CORP.,** Helicopter Div.,  
Fort Worth, Texas  
Helicopters, H-13H, spares, special tools,  
ground handling equipment—21 ea.—  
\$443,000

**BENDIX AVIATION CORP.,** Bendix Products  
Div., South Bend, Ind.  
Wheel assys., brake assys.—4,347—\$3.  
290,278

Carburetors and maintenance parts for  
various Naval aircraft—various—\$33.  
463  
Maintenance parts used on brake as-  
semblies—various—\$32,135  
Brake assy.—306 ea.—\$80,675  
Maintenance parts—24,388—\$771,944  
Brake, wheel assys., and maintenance  
parts—various—\$41,237

**BENDIX AVIATION CORP.,** Eclipse Ma-  
chine Div., Elmira, N. Y.  
Vehicle parts—2,900 ea.—\$36,409

**BENDIX AVIATION CORP.,** Eclipse-Pioneer  
Div., Teterboro, N. J.  
Air turbine starters—72—\$119,820  
Adapters—115 ea.—\$116,796

**BENDIX AVIATION CORP.,** Pacific Div.,  
North Hollywood, Calif.  
Actuators—142 ea.—\$51,716

**BENDIX AVIATION CORP.,** South Mon-  
trose, Pa.  
Pilot production of mil type synchros—  
12,000 ea.—\$1,561,307.48

**BENDIX AVIATION CORP.,** Red Bank Div.,  
Eatontown, N. J.  
Generator, assy.-engine drive—100—\$29  
520  
Generator—various—\$420,411  
Generators, regulators, voltage control  
panels—\$1,480,442

**BENDIX AVIATION CORP.,** Scintilla Div.,  
Sidney, N. Y.  
Maintenance parts—various—\$79,062

**BENDIX AVIATION CORP.,** Utica Div.,  
Utica, N. Y.  
Spare parts—\$42,193  
Starter assy.—200 ea.—\$56,018

**BOEING AIRPLANE CO.,** Seattle, Wash.  
First stage turbine wheel and shaft as-  
sembly—175—\$147,168  
Jet tanker aircraft, special tools, train-  
ing items, data, tests, MTU—\$15,000.  
000  
Facilities—\$8,500,000

**BORG-WARNER CORP.,** Long Mfg. Div.,  
Detroit, Mich.  
Tank parts—various—\$47,600

**BORG-WARNER CORP.,** Warner Gear Div.,  
Muncie, Ind.  
Transmission with gear shift assembly—  
1136—\$50,972  
Transmission with mounting assembly—  
326—\$27,328

**THE BRADFORD MACHINE TOOL CO.,**  
Cincinnati, Ohio  
Lathe, engine—19 ea.—\$208,628  
(Turn to page 124, please)



**TOP PERFORMANCE  
for HEAVY HAULING**

**BORG  
&  
BECK**

**TYPE "E"**

**CLUTCH**

- Husky—Heavy Duty
- Friction-Free
- Minimum Maintenance
- "Strap Drive"
- Smooth Engagement

Engineered by **BORG & BECK**

for that vital spot where power takes hold of the load



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**BORG-WARNER CORPORATION • CHICAGO 38, ILLINOIS**



*You build the right cab for your truck . . .*



## here's how to get the **right** heater, too!

**Your heater**, like the cab for your truck, should be designed and built to meet your own truck requirements.

The heater Evans engineers design and custom-build for you will meet *all* your truck requirements. It will fit *right* — for quick, easy installation. It will deliver all the BTU's needed for maximum driver safety and comfort—under *any* weather conditions.

And because Evans teams a special heavy-duty, continuous-service motor, exclusive

one-piece die-cast alloy fan, and sturdy fin and tube type core, the owner gets longer heater service with less maintenance.

Every Evans heater also carries a parts "repair or replace" warranty good for one year or 50,000 miles, whichever occurs first.

Phone or write to have an Evans engineering consultant call on you at no charge. And write now for your free copy of the new Evans Heater Catalog to: Evans Products Company, Dept. P-8, Plymouth, Michigan.

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Complete truck and bus systems . . . built right for the job!



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Long producers of the gears needed in high grade trucks and tractors, Fairfield now brings the same standards for GEAR PERFORMANCE to a wide variety of products: Agricultural Implements ... Power Shovels ... Machine Tools ... Diesel Locomotives ... Road Graders ... Lift Trucks ... Road Rollers ... Pump Drives ... Winches ... Military Vehicles ... and a host of others.

Fairfield's facilities are unexcelled. Here "under one roof" in a new and ultra modern plant designed especially for the purpose, Fairfield has everything needed for producing all kinds of gears: spur ... herringbone ... spiral bevel ... ground tooth spiral bevel ... straight bevel ... coniflex bevel ... hypoid ... zerol ... worms and worm gears ... splined shafts ... differentials. Get acquainted with Fairfield's engineering and production facilities. Your inquiry will receive prompt attention. FAIRFIELD MANUFACTURING COMPANY, 2303 South Concord Road, Lafayette, Indiana.

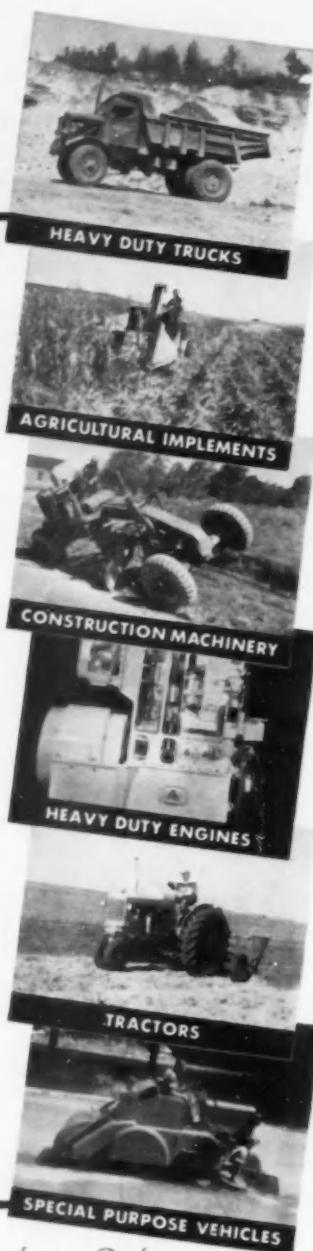
*Fine Gears Made to Order*

# FAIRFIELD



LAFAYETTE

INDIANA



(Continued from page 122)

**BREEZE CORPORATION, INC., Union, N. J.**  
Harness, ignition assy.—2,550 ea.—\$119.136

**THE BUDD CO., Detroit, Mich.**  
Vehicle parts—5,508—\$91,212

**CAMPBELL CHAIN COMPANY, York, Pa.**  
Vehicle parts—9,530—\$37,648

**CANADIAN COMMERCIAL CORP., Washington, D. C.**  
Aircraft, L-20A, spare parts, special tools 31 ea.—\$711,534  
L-20 airplanes and data special tools—28—\$1,227,792  
L-20A airplanes, special tools and GHE spares—9 ea.—\$504,559

**CATERPILLAR TRACTOR CO., Peoria, Ill.**  
Grader, road—various—\$441,573

**THE CESSNA AIRCRAFT CO., Wichita, Kan.**  
Aircraft, L-19A, spare parts, special tools, ground handling equipment—100 ea.—\$438,992

**CHRYSLER CORP., Detroit, Mich.**  
Tank parts—3,900—\$422,292  
Auto supplies—various—\$194,716

**CLARK CABLE CORP., Cleveland, Ohio**  
Vehicle parts—9,390—\$90,501

**CLARK EQUIPMENT CO., Benton Harbor, Mich.**  
Loader, scoop type—3 ea.—\$26,419  
Trucks, straddle carrier—2 lots—\$523,804.08

**THE CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio**  
Strut assy.—13 ea.—\$42,423  
Nose strut and parts—various—\$12,763  
Maintenance parts—various—\$116,158

**COLUMBUS JACK CORPORATION, Columbus, Ohio**  
Wheel assy., drive track—1,947 ea.—\$99,569

**CONSOLIDATED DIESEL ELECTRIC CORP., Stamford, Conn.**  
Kits, compressor, and installation of kits—550 ea.—\$8,150,645

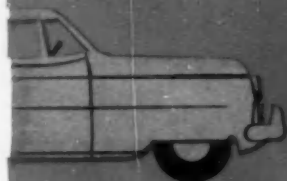
**CONSOLIDATED ENGINEERING CORP., Pasadena, Calif.**  
Electronic measuring system components—\$72,561

**CONTINENTAL AVIATION AND ENGINEERING CORP., Detroit, Mich.**  
Engines, J69-T-9, special tools—40 ea.—\$1,127,288  
Overhaul of 975-19 engine—6 ea.—\$30,000  
Production tooling—\$474,118  
Engines, J69-T-19—8 ea.—\$179,417  
Concept study of the feasibility of the application of the free piston engine to military vehicles—RAD—\$49,300  
J69-T-9 engines and MC-1 starter-generators—92 ea.—\$2,299,356  
J69-T-9 engines, starter generators, and special tools—various—\$1,332,828  
Spare parts—\$27,182.80  
Design and development of AOS-628-1—job—\$665,054

**CONTINENTAL MOTORS CORP., Detroit, Mich.**  
Engine parts—various—\$147,270  
Tank parts—various—\$457,224

**CONTINENTAL MOTORS CORP., Muskegon, Mich.**  
Engines, O-470-11—159 ea.—\$524,079  
(Turn to page 126, please)

**more cars and trucks**



**are factory-equipped**

**with FRAM**



**than any other make**

**OVER 150 LEADING MANUFACTURERS SPECIFY  
FRAM AS STANDARD EQUIPMENT**

Year after year, FRAM leads the industry in design, development and production of finer filtration systems. This FRAM leadership can help solve your problem in oil, air, fuel or water filtration. FRAM engineering facilities, including the FRAM Dust Tunnel at Dexter, Michigan, are at your disposal.

FRAM CORPORATION,  
Providence 16, R. I.  
Fram Canada Ltd.,  
Stratford, Ont.



**FRAM**  
OIL • AIR • FUEL • WATER  
**FILTERS**



(Continued from page 124)

Engine, PC 60-5 for F-6 refuelers—982—\$3,534.684  
Engines, PE 150-6 for MD-3 generator sets  
Engine spare parts—3,968—\$55,194  
Tank parts—7,692—\$37,460  
Vehicle parts—771—\$52,582  
Repair parts—5,474—\$35,328  
Aircraft engines—56 ea.—\$163,904

CURTISS-WRIGHT CORP., Propeller Div., Caldwell, N. J.  
Retrofit kits—\$175,600

CURTISS-WRIGHT CORP., Wright Aeronautical Div., Woodridge, N. J.  
Engines, J65-W-5—\$8,359,956

Engines, J65-W-6 and related equipment—\$32,541,952  
Engine spares for Model 3350-32W aircraft engine—various—\$33,237  
Turbo compound engines and special tools—81 ea.—\$7,044,465  
Maintenance and overhaul tools, bulk—\$800,000

D-J INDUSTRIES, INC., Clearfield, Pa.  
Muffler engine exhaust—942—\$126,698

DENISON ENGINEERING CO., Columbus, Ohio  
Facilities for manufacture of aeronautical hydraulic pumps—\$78,000

DIAMOND T MOTOR CAR CO., Chicago, Ill.  
Support vehicles—115—\$678,986

DOUGLAS AIRCRAFT CO., INC., Long Beach, Calif.  
Spares for 45 RB-66B aircraft, spares for 42 RB-66C—\$3,146,900

EATON MFG. CO., Detroit, Mich.  
Tank parts—5,749—\$31,676  
Tank and combat vehicle parts—3,532—\$31,547

ELECTRIC AUTO-LITE CO., Toledo, Ohio  
Vehicle parts—30,640—\$103,256

ELECTRO-MECHANICAL PRODUCTS CO., Garden City, Mich.  
Tank parts—1,844 ea.—\$27,660

ENSIGN ELECTRIC AND MFG. CO., Huntington, W. Va.  
Tank parts—597—\$36,405

FAIRBANKS, MORSE & CO., Los Angeles, Calif.  
Repair parts—various—\$85,230

FAIRBANKS, MORSE & CO., Fair Lawn, N. J.  
Repair parts for Diesel engines—29,415—\$147,986

FAIRCHILD ENGINE & AIRPLANE CORP., Fairchild Aircraft Division, Hagerstown, Md.  
Utility-command aircraft study—job—\$58,469.65

FAIRCHILD ENGINE & AIRPLANE CORP., Fairchild Guided Missile Div., Wyandanch, N. Y.  
Guided missile—\$227,293

FARGO MOTOR CORP., Washington, D. C.  
Trucks—2,003—\$3,806,472

FARGO MOTOR CORP., Detroit, Mich.  
Support vehicles—47—\$143,519

FELT PRODUCTS MFG. CO., Chicago, Ill.  
Kit, repair transmission—38,230—\$161,391

FLETCHER AVIATION CORP., Rosemead, Calif.  
Jettisonable fuel tanks, 1700 gal.—5551 ea.—\$13,127,464

FOOD MACHINERY AND CHEMICAL CORP., San Jose, Calif.  
Drive, right angle, left assy., right assy.—\$203,975  
Differential—\$286,852  
T59 vehicle, increase in costs—\$244,078

FORD MOTOR CO., Ford Div., Washington, D. C.  
Trucks—27 ea.—\$72,509

FORD MOTOR CO., Ford Div., Livonia, Mich.  
Support vehicles—1,480—\$1,922,307

FORD MOTOR CO., Dearborn, Mich.  
Engine, J57-F-13, less afterburner assembly—143—\$25,702,445

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.  
Truck, fire—15 ea.—\$177,984

FRUEHAUF TRAILER CO., Detroit, Mich.  
Vehicle parts—153—\$40,488

GAR WOOD INDUSTRIES, INC., Wayne, Mich.  
Crane, crawler mounted—various—\$281,385  
Auto parts—various—\$149,030  
Winch assy.—110 ea.—\$51,832

THE GARRETT CORP., AiResearch Mfg. Co. Div., Phoenix, Ariz.  
Gas turbine auxiliary power units and spares—2—\$49,000

THE GARRETT CORP., AiResearch Mfg. Co. Div., Los Angeles, Calif.  
Maintenance parts—various—\$738,591  
(Turn to page 128, please)



*Automatic "MEMORY" for motorists . . . . .*

"FLASH! . . . DANGER! . . . OIL PRESSURE LOW!" That's the trouble-saving, money-saving warning this dependable new FASCO Low Pressure Indicating Switch never fails to deliver. It's small . . . but it's a BIG factor in keeping the motorist pleased with his car . . . another "plus" sales feature worth considering.

On "public carriers," the "451" FASCO also fills the need for a Low Pressure Indicating Switch for warning of low pressure in the air brake system.

CONSULT **FASCO** . . . FIRST!

AUTOMOTIVE DIVISION  
**FASCO**  
INDUSTRIES, INC.  
ROCHESTER 2, NEW YORK

DETROIT OFFICE—12737 PURITAN—PHONE: UN 17476



Here's a straightening press that **HELPS**  
your operator

It's a **CLEARING**

You bring the anvil down to the work, then step on the foot control. The machine reacts to your movements as if it were an extension of your own nervous and muscular system. The bar you're straightening bends in response to the pressure you exert with your foot . . . just the right amount . . . release the pressure . . . gauge the part. It takes a combination of judgment and feel to do an efficient job of straightening. And a Clearing press gives you that feel. That's why operators like the Clearing.

Clearing straightening presses are available with extension tables that give you wide latitude in the size and shape of parts you can straighten quickly and easily. Get the details on Clearing straightening presses. Write for our specification folder. No obligation.

The Clearing straightening press installed at the Clark Equipment Company, Jackson, Michigan, has control sensitivity that gives the operator a better feel of the straightening job.

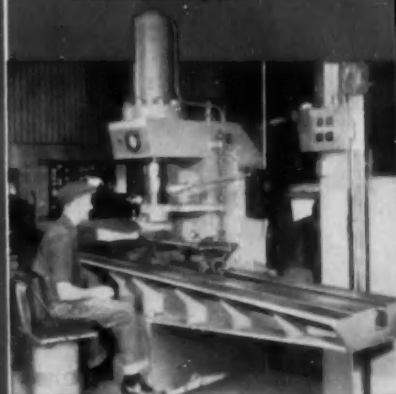
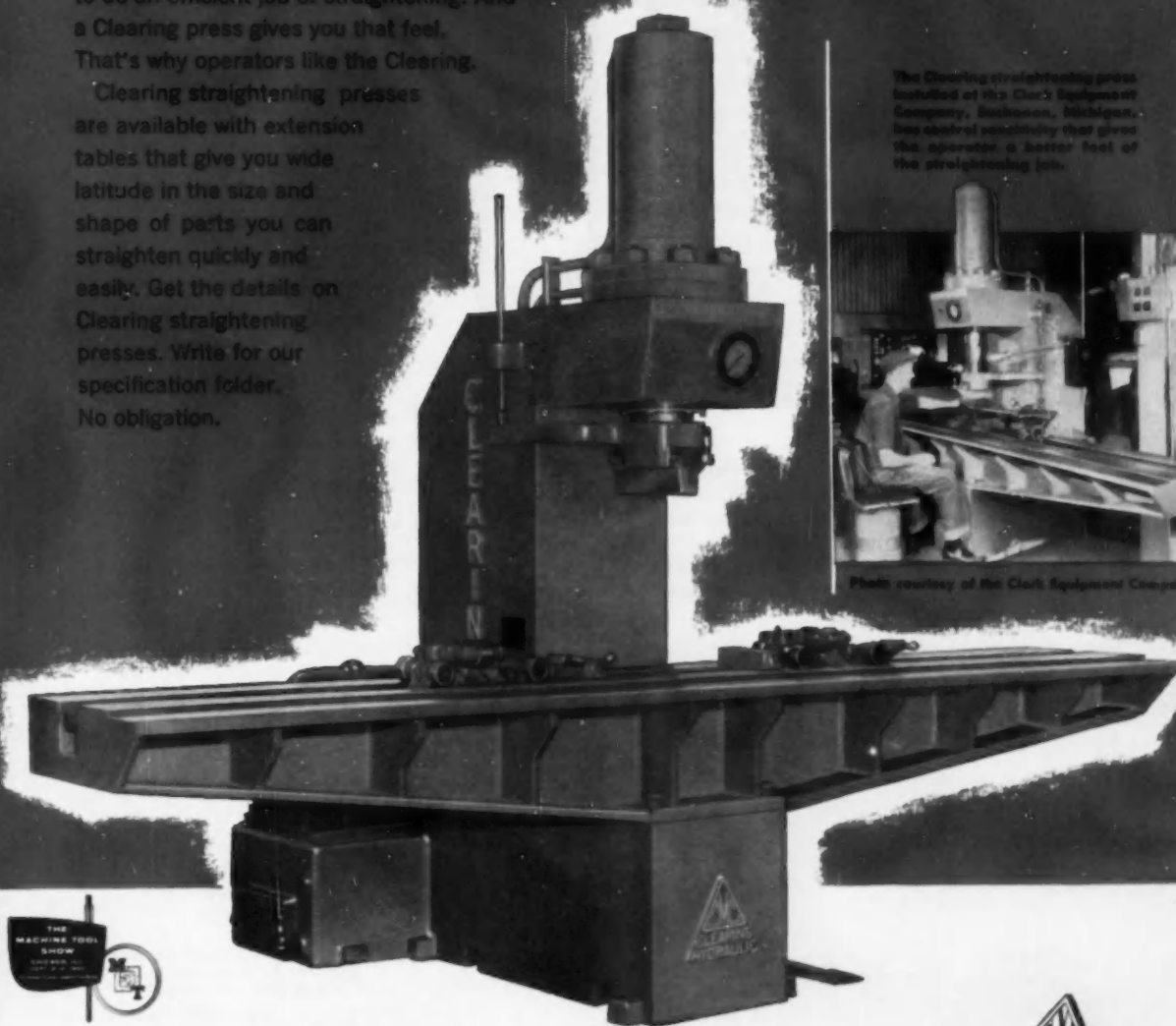


Photo courtesy of the Clark Equipment Company.



**CLEARING PRESSES**

THE WAY TO EFFICIENT MASS PRODUCTION

**CLEARING MACHINE CORPORATION** DIVISION OF **U.S. INDUSTRIES, INC.**

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# Here's the best shortcut in the field of electroplating

One operation usually removes rust and oil at the same time. One alkaline tank may remove oxides, drawing compound residues and other stubborn soils... even strip zinc and cadmium from rejects and racks.

Sensational Oakite Rustripper frequently eliminates acid pickling and its troublesome after-effects: (1) hydrogen embrittlement; and (2) smut that must be removed by electrocleaning or hand brushing.



**FREE** Our illustrated booklet tells how this shortcut may save you time and money—in tank lines, in automatic platers, in barrel lines—by saving equipment, floor space, acids, water, steam and electricity. Write or send coupon for your copy.

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COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_



At The Production Engineering Show  
Visit Oakite Booth No. 652

Technical Service Representatives in Principal Cities of U. S. and Canada

(Continued from page 126)

- GEAR GRINDING MACHINE CO.,** Detroit, Mich.  
Auto spare parts—1,206—\$865,909
- GENERAL DYNAMICS CORP.,** Convair Div., San Diego, Calif.  
Pre-production expenditures for F-102B airplane program—\$5,000,000  
F-102 aircraft parts—\$143,222  
Spare parts—\$510,876
- GENERAL DYNAMICS CORP.,** Convair Div., Fort Worth, Texas  
Type aircraft—21—\$5,412,651.61
- GENERAL ELECTRIC CO.,** Washington, D. C.  
Power supplies for starting aircraft gas-turbine engines and aircraft servicing—39—\$148,200
- GENERAL ELECTRIC COMPANY,** Hotpoint Co. Div., Chicago, Ill.  
Turbosuperchargers—210—\$495,600
- GENERAL ELECTRIC CO.,** West Lynn, Mass.  
Generators, control panels—122—\$113,481
- GENERAL ELECTRIC CO.,** Cincinnati, Ohio  
Repair, overhaul and modification of J47 and J-25 engines—2,728—\$7,149,990  
Repair, overhaul and modification of J73 engines—165—\$2,329,668
- GENERAL ELECTRIC CO.,** Philadelphia, Pa.  
Maintenance parts aircraft—various—\$44,918
- GENERAL MOTORS CORP.,** AC Spark Plug Div., Flint, Mich.  
Auto spare parts—12,539—\$56,267  
Product engineering services—job—\$500,000
- GENERAL MOTORS CORP.,** Allison Division-Aeroproducts Operations, Dayton, Ohio  
Prop. assys.: prop. assys., training—76—\$1,965,080
- GENERAL MOTORS CORP.,** Allison Div., Indianapolis, Ind.  
Body, steering control, valve assy.—528—\$37,224  
Transmission assembly—1,147—\$8,788,285  
Special tools and GHE for turbojet engines—various—\$400,000  
Modification of J33-A-16/16A exhaust unit assemblies—450 ea.—\$194,346
- GENERAL MOTORS CORP.,** Chevrolet Motor Div., Detroit, Mich.  
Vehicles—3,883—\$4,496,461
- GENERAL MOTORS CORP.,** Cleveland Diesel Engine Div., Cleveland, Ohio  
Repair parts for Diesel engines—19,088—\$930,907
- GENERAL MOTORS CORP.,** Delco Products Div., Dayton, Ohio  
Spare parts—various—\$71,770
- GENERAL MOTORS CORP.,** Detroit Diesel Engine Div., Detroit, Mich.  
165 hp Diesel engines—83—\$391,072.19  
Auxiliary engine tank—1,772 ea.—\$30,442
- GENERAL MOTORS CORP.,** Detroit Transmission Div., Ypsilanti, Mich.  
R-1300 engine spare parts—64,082—\$106,955
- GENERAL MOTORS CORP.,** Harrison Radiator Div., Lockport, New York  
Spare parts—various—\$140,174
- GENERAL MOTORS CORP.,** Truck & Coach Div., East Pontiac, Mich.  
Auto spare parts—20,000—\$971,887  
Support vehicles—152—\$694,882

(Turn to page 135, please)

# **announcing A NEW NEW BRITAIN +GF+ COPYING LATHE**

**designed for the highest production jobs in the world**

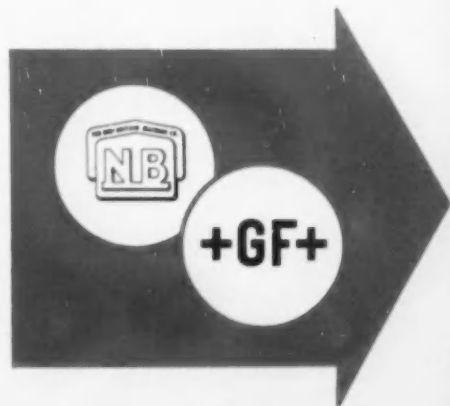
**T**HE New Britain +GF+ Copying Lathe was originally designed as a highly versatile quickly-tooled machine, which is available in eight different models, and is an outstanding profit maker on both short and long runs.

Now New Britain has added two new models, the  $1\frac{1}{2}$ s and  $1\frac{1}{4}$ n which successfully apply the basic principles of this new approach to copy turning, to the highest production applications in metalworking history. One of these new machines, a typical work piece and diagrams of the operations performed, are shown on the two following pages.

If you have work that requires contour turning and facing, the New Britain +GF+ has basic profit-making advantages. You should know about them, regardless of whether your needs call for small lots, or automated long-run production.

A NEW APPROACH TO COPY TURNING is the title of a new color motion picture which is available for showing in your plant. Ask your New Britain Representative, or write The New Britain Machine Company, New Britain, Connecticut.

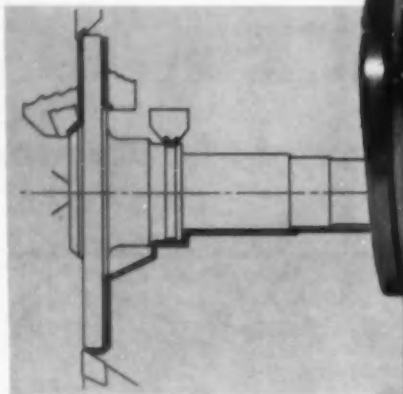
*(See the following two pages for more details)*



# New High-production New Britain +GF+

... continued from preceding page

a new approach to important savings



**F**OR the typical rear axle shaft illustrated, a double carriage design plus infeed attachment permits machining both ends at once, eliminating wasteful idle time.

This new copying lathe features pick-off change gear headstock, combined with a selector lever for high and low spindle speed range. Its basic advantages of template control, easy chip removal and elimination of expensive form tools are readily adaptable to a wide variety of work which ordinarily would require many more tools, and, in some cases, further operations on additional machines. Get the facts from your New Britain Sales Representative or write the factory.

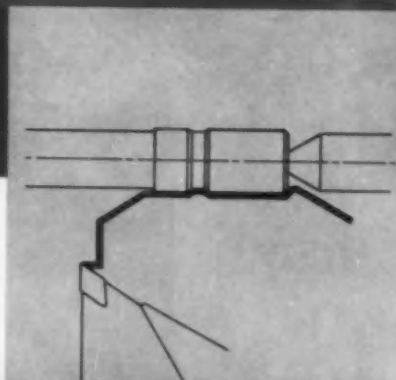


**The NEW BRITAIN MACHINE COMPANY**



# Copying Lathe...

on your "expensive" pieces



New Britain-Gridley Machine Division, New Britain, Connecticut • Lucas Machine Division, Cleveland 8, Ohio

• AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES  
• LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN "C" COPIING LATHES

## The Machine Tool Show

September 6-17, 1955

International Amphitheatre

Chicago, Ill.

# 18,721\*

## engineers in search of NEW IDEAS

... and more than 150 of the country's leading machine tool builders, all assembled under one roof, ready to demonstrate their newest models, their fastest, most ingenious, most economical metalworking methods.

Where? At the 1955 Machine Tool Show—the largest, most important of its kind—and the first since 1947.

Plan now to attend. Nowhere else can you see so much in so short a time. And, as a bonus attraction, you can see the Production Engineering Show at no extra cost. One ticket admits to both: the Machine Tool Show, at the International Amphitheatre, and this companion show of machine tool accessories, on the Navy Pier.

If you're looking for new ideas, new ways to cut production costs, come to Chicago in September. The 1955 Machine Tool Show is the best chance you've ever had to see the world's best investment—in action!

**NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION**  
2071 East 102 Street • Cleveland 6, Ohio

**THE  
MACHINE TOOL  
SHOW**

CHICAGO, ILL.  
SEPT. 6-17, 1955

INTERNATIONAL AMPHITHEATRE



\* Estimated Attendance, Before Receiving Your Reservation

Superior  
Stainless

# Superior Strip Steels

**basic materials**

SuVeneer®  
Copper Clad Metal

SuVeneer®  
Brass Clad Metal

"QUICK FACTS on Superior Strip Steels" . . . and  
"An Introduction to Clad Metals" . . . two useful, free  
publications you should have. Write for them today!



## Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

in modern product fabrication—wherever

lower costs

higher performance

better appearance

are vital to sales

The almost limitless range of fabrication provided by Superior Stainless and SuVeneer® Clad Metals makes these materials truly basic in metal product design and manufacture. Each Superior coil represents precision manufacture at its best—strip accurate in gauge, width and specified finish—uniform in composition—exact in temper for your particular need. *Check with us!*

### SUPERIOR PRODUCTS

#### Hot Rolled and Cold Rolled Strip Steels

- Stainless of all Analyses
- SuVeneer® Clad Metals
- Alloys, Spring Steels and Specialties

## Unusually Tough BOLTS!

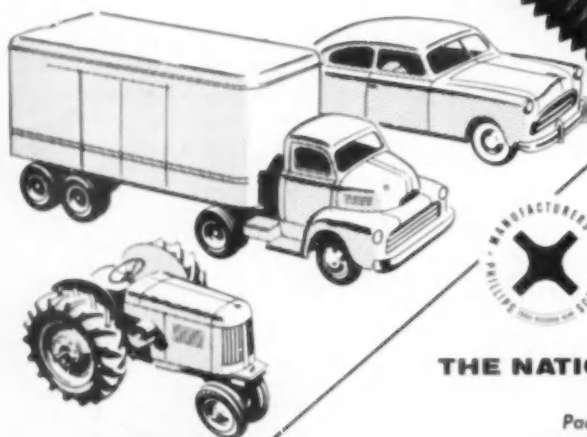
As vital parts of tractors, dirt movers and other heavy-duty equipment, these big bolts can take a terrific beating and still hold fast. They will resist shear, fatigue and impact that no common bolts could withstand without wear or breakage. Special heat-treatment produces this unusual toughness, making these National bolts capable of enduring extremely severe stresses.

By cold heading and special production methods, National can turn out many special headed-and-threaded fasteners which, like these bolts, solve special problems or reduce costs. Depend on National's extensive manufacturing facilities and complete line of fasteners for your needs.

Write for a free copy of National's "Special" fastener booklet.

### Representatives in:

Chicago	Indianapolis	Philadelphia
Cincinnati	Kansas City, Mo.	Portland
Dallas	Lansing	Rochester
Denver	Milwaukee	San Francisco
Detroit	Minneapolis	St. Louis
	New York	



### THE NATIONAL SCREW & MFG. COMPANY CLEVELAND 4, OHIO

Pacific Coast: National Screw & Mfg. Co. of Cal.  
3423 South Garfield Ave., Los Angeles 22, Cal.



Fasteners



Hodell Chains



Chester Hoists



(Continued from page 128)

**GENERAL MOTORS CORP., United Motors Service Div., Detroit, Mich.**  
Spare parts—\$35,700.19

**THE GENERAL TIRE AND RUBBER CO., Akron, Ohio**  
Wheel assys. for T33A aircraft. Wheel assys. for F-86F aircraft—605—\$46,710

**THE B. F. GOODRICH CO., Akron, Ohio**  
Wheel assys—176—\$83,412

**THE GOODYEAR TIRE AND RUBBER CO., Akron, Ohio**  
Brake assemblies, wheel assemblies—328—\$66,415  
Maintenance parts used on brake and wheel assemblies—2,336 ea.—\$27,643  
Brake assemblies, wheel assemblies—316—\$59,275  
Wheel assemblies—677—\$75,605

**GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, L. I., New York**  
Flap assemblies, elevator float and maintenance parts—various—\$37,366

**HABERLE ENGINEERING & MFG. CO., Aurora, Ill.**  
Vehicle parts—2,346—\$29,301  
Tank parts—5,973—\$29,267

**HALL-SCOTT MOTORS COMPANY, Berkeley, Calif.**  
Gasoline engine—28—\$342,885  
Spare parts—\$26,334  
Fly wheel w/ring gear assembly—\$41,244  
Spare parts, change orders—\$39,851

**HARNISCHFEGGER CORP., Milwaukee, Wis.**  
Spare parts—various—\$32,503

**HAWK TOOL AND ENGINEERING CO., Clarkston, Mich.**  
Parts—178—\$49,804

**HERCULES MOTOR CORP., Canton, Ohio**  
Engine parts—various—\$27,442

**HIGHLAND AUTO & TRUCK SUPPLY, Los Angeles, Calif.**  
Vehicle parts—1,335 ea.—\$32,547

**HOLLEY CARBURETOR COMPANY, Van Dyke, Mich.**  
Maintenance parts—various—\$707,633

**THE FRANK G. HOUGH CO., Libertyville, Illinois**  
Loader, scoop type—8 ea.—\$45,265

**HOWE FIRE APPARATUS COMPANY, Anderson, Ind.**  
Trucks—1 ea.—\$10,077

**HYSTER COMPANY, Portland, Oregon**  
Trucks, forklift—22 ea.—\$126,880

**INTERNATIONAL GENERAL ELECT CO., Washington, D. C.**  
Arc welders and trailers—13 ea.—\$29,825

**INTERNATIONAL HARVESTER, Melrose Park, Ill.**  
Tractor, full tracked—323—\$3,757,894

**INTERNATIONAL HARVESTER CO., Washington, D. C.**  
Trucks—306—\$691,840  
Trucks, rescue—26 ea.—\$219,622  
Support vehicles—171—\$688,585

**JACK & HEINTZ, INC., Cleveland, Ohio**  
Motor-generators and data—\$274,029  
Generators, aircraft—408—\$142,178  
Generators—2,125 ea.—\$50,408  
Starter—74—\$30,951  
Generator, tachometer—1153—\$28,594

**JERED INDUSTRIES, Detroit, Michigan**  
Variable transmission—item—\$52,628

**KAISER ALUMINUM AND CHEMICAL CORP., Oakland, Calif.**  
Facilities for the production of extrusions—\$738,350  
(Turn to page 136, please)



Engineer Wallace Feemster and Press Foreman Sherwood Henderson watch as 600-ton Warco Eccentric Gear Press performs five stamping and drawing operations in manufacture of refrigerator motor housing.

**"Presses That Stand Up Plus  
A Desire to Serve After Sale  
Is Why I Choose WARCO..."**

**Says Chief  
Engineer of  
One of  
America's  
Foremost  
Stamping  
Firms**

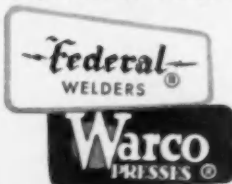
"When it comes to quality, the Warco Press is one of the finest, and we like the way Warco engineers stay with the sale until everything is satisfactory," say engineers of the Bingham-Herebrand Corporation, Toledo, O.

"If for any reason our Warco equipment requires factory service, a phone call brings them on the run," they continue, "and it's this kind of

service that must be considered when buying equipment today."

Bingham-Herebrand is one of the nation's leading custom stamping, forging, and fabricating firms and through the years has used equipment of many makes and is well qualified to make machine comparisons.

If you want quality press equipment backed up by excellent service, add the name Warco to your press supplier list. Representatives in principal cities.



**The Federal Machine and Welder Company**  
Warren, Ohio



(Continued from page 135)

**KEARFOTT COMPANY, INC.**, Little Falls, New Jersey  
Special tools and test equipment—\$248,920

**KELSEY-HAYES WHEEL COMPANY**, Detroit, Mich.  
Wheel assembly—33,638 ea.—\$398,892

**KENTUCKY MANUFACTURING CO., INC.**, Louisville, Ky.  
Vehicles—14 ea.—\$64,751

**KOEHRING COMPANY**, Milwaukee, Wis.  
Crane-shovel—various—\$653,149

**KOTTLER METAL PRODUCTS, INC.**, Cleveland, Ohio  
Tank parts—1,425—\$36,138

**E. A. LABORATORIES, INC.**, Brooklyn, N. Y.  
Vehicle parts—14,612—\$73,285

**LACROSSE TRAILER CORP.**, Lacrosse, Wis.  
Support vehicles—33—\$125,143

**LEAR, INC.**, Grand Rapids, Michigan  
Indicator, control—590—\$892,340  
Indicator—277—\$202,509

**LEAR, INC.**, Lear-Romec Div., Elyria, Ohio  
Pump and connector assemblies—various—\$140,029

**LOCKHEED AIRCRAFT CORP.**, Burbank, Calif.  
69 Model TV-2 aircraft spare parts, special tools & GHE technical data—\$2,500,000  
T-33A aircraft, spare parts, special tools and GHE—95—\$3,536,000

**LOEWY CONSTRUCTION CO., INC.**, New York, N. Y.  
Manual for plastic forming of aircraft components—job—\$101,000

**MC DONNELL AIRCRAFT CORP.**, St. Louis, Missouri  
Maintenance parts—various—\$27,962  
Ground handling equipment—various—\$30,103

**MACK MFG. CORP.**, Washington, D. C.  
Support vehicles—13—\$143,099  
Truck, dump, 15 ton—7 ea.—\$132,340  
Truck, tractor, 10-ton—148 ea.—\$3,959,153  
Truck, cargo, five ton—85 ea.—\$1,018,118  
Chassis, truck, five ton—44 ea.—\$521,627

**MACK MFG. CORP.**, Somerville, N. J.  
Repair parts—various—\$67,807

**MARCH MANUFACTURING COMPANY**, Skokie, Ill.  
Winch assembly—925 ea.—\$152,625

**THE GLENN L. MARTIN CO.**, Baltimore, Maryland  
Maintenance parts—various—\$36,925

**MC QUAY MORRIS MFG. CO.**, St. Louis, Missouri  
Vehicle parts—5,782—\$32,957

**MICHIGAN STEEL TUBE PRODUCTS CO.**, Detroit, Michigan  
Pipe, muffler to tail pipe extension—16,792 ea.—\$138,450.04

**MODINE MANUFACTURING CO.**, Racine, Wis.  
Radiator assembly—821—\$58,652

**MUSKEGON CAMSHAFT CO.**, Muskegon, Michigan  
Vehicle parts—8,703—\$543,625

**NASH ENGINEERING CO.**, South Norwalk, Connecticut  
Pump assembly-fuel booster—215 ea.—\$93,331  
Pumps—various—\$175,320

**NILES-BEMENT-POND CO.**, Chandler-Evans Div., W. Hartford, Conn.  
Spare parts—\$55,292.15

**NORTH AMERICAN AVIATION, INC.**, Los Angeles, Calif.  
Utility-command aircraft study—job—\$64,996  
F-100-D aircraft, spare parts special tools—\$251,260

**NORTHROP AIRCRAFT, INC.**, Hawthorne, Calif.  
F-89H mobile training units, E-6 fire control system trainers—5—\$1,039,733

**THE OLIVER CORP.**, Chicago, Illinois  
Tractor, wheeled, agricultural type—33 ea.—\$50,173  
Tractor, wheeled, industrial type—87 ea.—\$174,584

**ONSRUD MACHINE WORKS, INC.**, Chicago, Illinois  
Milling machine, airframe, packaging, chip collection—54—\$4,695,966

**OSHKOSH MOTOR TRUCK, INC.**, Oshkosh, Wisconsin  
Repair parts—various—\$133,279  
Trucks—10 ea.—\$126,287

**THE F. W. D. PACIFIC CO.**, San Francisco, Calif.  
Spart parts—51 ea.—\$32,117

**PARAMOUNT PRODUCTS, INC.**, Peabody, Kansas  
Trailers, fuel servicing spares—15—\$29,992

**L. A. PEREIRA & COMPANY**, Chicago, Ill.  
Gear, set bevel fan drive—3,196 ea.—\$31,576.48

(Turn to page 138, please)

## JOHNSON *tappets*



*keep pace with today's engines*

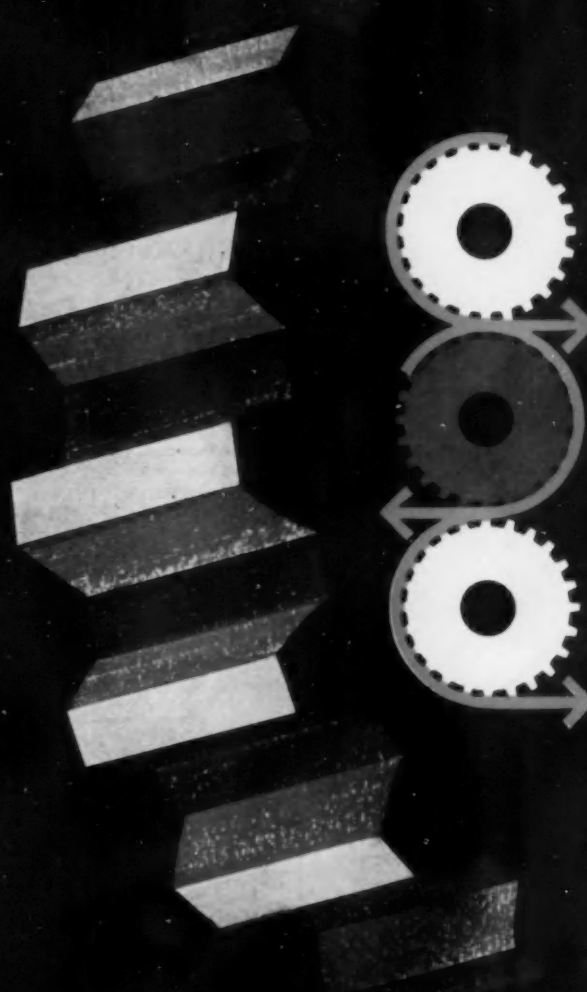
Continual experimentation and excellent manufacturing methods show a steady product improvement that make JOHNSON TAPPETS worthy of your consideration.

Only proven materials, covering a range of steel, chilled iron, and various iron alloys are used in the manufacture of JOHNSON TAPPETS, providing greater strength, light weight and increased wear resistance. Serving the AUTOMOTIVE — AIRCRAFT — FARM — INDUSTRIAL — MARINE Industries.

"tappets are our business"

**JOHNSON *JP* PRODUCTS**  
MUSKEGON, inc. MICHIGAN

# 4150 steel is your best bet for heavy sections



Chromium Molybdenum Steel like AISI-SAE 4150 is the most economical way to uniform properties throughout heavy sections. For heavy duty gears — for shafts — wherever toughness and fatigue strength are important, plentiful 4100 Moly steels are better. We will prove it. Climax Molybdenum Company, 500 Fifth Ave., New York 36, N. Y.

AISI-SAE 4150

C 0.48-0.53	Mn 0.75-1.00	Pmax 0.040	Smax 0.040
S 0.20-0.35	Cr 0.80-1.10	Mo 0.15-0.25	

4100 steels are your best bet

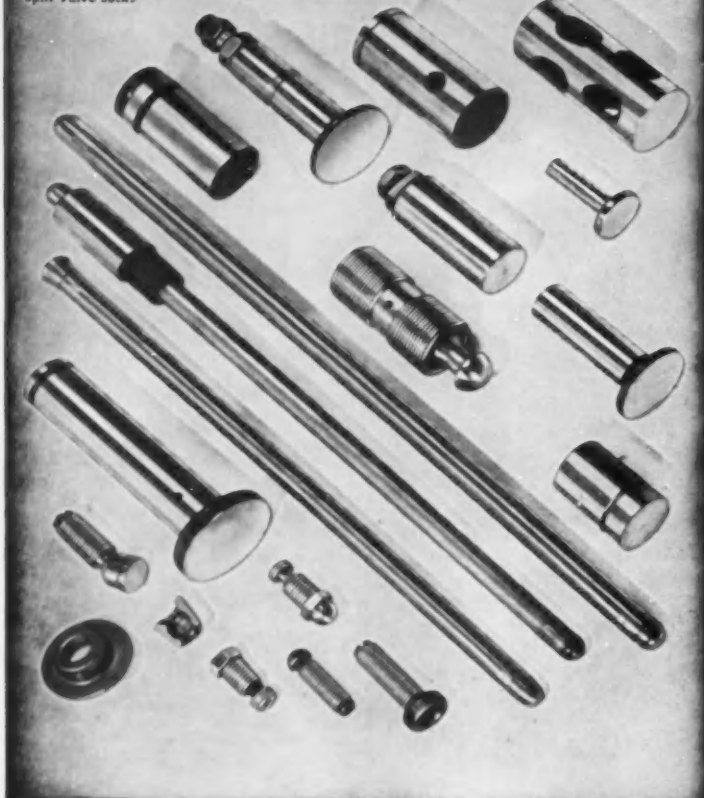
## CLIMAX MOLYBDENUM

M55-13

# "CHICAGO" precision valve gear parts

•STEEL •CAST IRON •STEEL and IRON

Hydraulic Tappets • Hydraulic Units for Push Rods and  
Rocker Arms • Mechanical Tappets • Push Rods • Self  
Locking and Standard Thread Adjusting Screws • Adjusting  
Screw and Pad Assemblies • Valve Spring Retainers •  
Split Valve Locks



Connecting Rod Bolts.....Hydraulic Cylinder Pistons  
Cylinder Head Studs.....Cylinder Head Cap Screws  
Main Bearing Studs.....Main Bearing Cap Screws  
Flywheel to Crankshaft Screws.....Diesel Energy Cells  
Wheel Bolts and Studs.....Differential Carrier Screws  
Oil Pump to Distributor Shafts.....Rocker Arm Shafts  
Automatic Transmission Valves.....Water Pump Shafts  
Roller Followers.....Ball Joint Assemblies

External and Internal Grinding, Thread Grinding, Precision Roll Threading

Heat Treating • Carbon Restoration • Carburizing • Carbo Nitriding • Cyaniding •  
Hydrogen Brazing • Complete Metallurgical,  
Dynamometer and Testing Laboratories

Special Screw Machine Parts  $\frac{1}{16}$ " to 5" Diameter  
• Cold Upset  $\frac{3}{16}$ " to 1" Diameter • Cap Screws  
• Set Screws • Nuts • Studs • Taper Pins  
• Socket Screw Products

**The CHICAGO  
SCREW COMPANY**  
2801 WASHINGTON BLVD.  
BELLWOOD, ILLINOIS  
Established 1872

(Continued from page 136)

**PETTIBONE MULLIKEN CORP., Chicago, Illinois**

Crane truck—4—\$46,391  
Loader, scoop type—5 ea.—\$47,543  
Trucks, fork-lift—2 ea.—\$70,000

**PIASECKI HELICOPTER CORP., Morton, Pa.**

Spare parts for 90 H-21C helicopters—  
\$8,000,000  
Model H-21B, H-21C helicopters—99—  
\$10,850,000

**PROGRESS MFG. CO., Arthur, Ill.**

Truck, fire—9 ea.—\$93,695

**REO MOTORS, INC., Washington, D. C.**

Truck cab and chassis only—35 ea.—  
\$204,134

**REO MOTORS, INC., Lansing, Michigan**

Auto parts—64,075—\$304,180  
Vehicle parts—10,000 ea.—\$57,200  
Trucks—90 ea.—\$549,184

**REPUBLIC AVIATION CORP., Farmingdale, L. I., New York**

230 gallon tanks, 450 gallon tanks—  
\$2,498,182  
Modification of three mobile training  
units—\$135,607

**ROCKY MOUNTAIN EXPORT CO., Denver, Colorado**

Trucks, cab and chassis with oil field body  
—15 ea.—\$153,144

**ROYAL JET, INC., Alhambra, Calif.**

Tank assemblies—1218 ea.—\$1,448,014

**SAWYER BAILEY CORP., Buffalo, New York**

Fan, oil cooler, right assembly, left as-  
sembly—1,471—\$434,518

**SCHILLER-PFEIFFER MACHINE WORKS, Southampton, Pa.**

Tank parts—4,837—\$210,409

**SCIACKY BROS., INC., Chicago, Illinois**

Welding machine—8—\$101,960

**SILENT HOIST AND CRANE CO., INC., Brooklyn, New York**

Crane truck—1—\$112,814

**A. O. SMITH CORP., Milwaukee, Wisconsin**

Procurability study for aircraft designer's  
manual—job—\$85,201.35

**SOLAR AIRCRAFT CO., San Diego, Calif.**

Design a 300 kw, 450 volt, 3 phase, 60  
cycle gas turbine generator set includ-  
ing all accessories and voltage regu-  
lator—\$60,310.00  
Gas turbine tailpipe, adapter—665 ea.—  
\$40,598

**SOUTHERN INDIANA MACHINE CO., INC., Worthington, Ind.**

Tank parts—2,241—\$45,649

**SPARKS-WITHINGTON CO., Spartan Auto-  
motive Div., Jackson, Mich.**

Vehicle parts—10,380—\$77,632

**THE SPERRY CORP., Sperry Gyroscope Co.  
Div., Great Neck, L. I., New York**

QF-80 drone systems—6 ea.—\$160,264

**STEWART-WARNER CORP., Chicago, Ill.**

Vehicle parts—30,394—\$119,257

**STOLPER STEEL CORP., Menomonee Falls,  
Wisconsin**

Vehicle parts—1,767 ea.—\$51,773

**STUDEBAKER-PACKARD CORP., Detroit,  
Michigan**

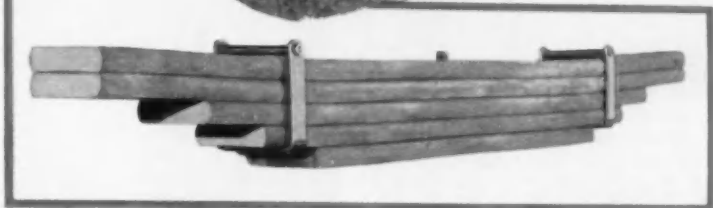
Conduct a design study of a gas turbine  
drive supercharger—\$96,000

**SUNSTRAND MACHINE TOOL CO., Sun-  
strand Aviation Division, Rockford, Ill.**

Constant speed drives, spare parts—  
\$2,000,000

(Turn to page 140, please)

# "Off the highway"



**T**HERE'S something stupendous about the performance of these big earth moving machines . . . something incredible, even while you're witnessing their dauntless accomplishments.

Pioneer in track-type power, Caterpillar in 1954 observed its 50th year "on tracks". Because of the extreme requirements of their heavy, off-highway equipment, BURTON takes a special pride in supplying springs which contribute so vitally to Caterpillar performance. For no other type of service demands so much, or proves so well what BURTON SPRINGS can do.

Make YOUR spring requirements the subject of a BURTON engineering analysis. Write today. Send blueprints or sketches. Find out how BURTON springs can improve your product.

**BURTON** AUTO SPRING CORP.  
... Vital Support for the Automotive Industry ...

WESTERN AVENUE AT FORTY-EIGHTH STREET

• CHICAGO 32, ILLINOIS

(Continued from page 138)

**SUPERIOR MAGNETO CORP.**, Long Island City, New York  
Parts—1,998—\$40,259

**THOMPSON PRODUCTS, INC.**, Cleveland, Ohio  
Valve assembly—721—\$76,722

**THOMPSON TRAILER CORP.**, Pikesville, Maryland  
Vehicles—269 ea.—\$1,159,743

**TITEFLEX, INC.**, Newark, New Jersey  
Cover, manifold, harness—4,450—193,192  
Engine parts—193,192

**THE TORRINGTON COMPANY**, South Bend, Indiana  
Spare parts—305 ea.—\$26,458

**UNITED AIRCRAFT CORP.**, Sikorsky Aircraft Div., Bridgeport, Conn.  
Helicopters, H-34A, spare parts for overhaul, spare parts for field and organization support, special tools and ground handling equipment—\$16,056,616  
H-37 mobile training units—1 set—\$428,988  
Fuselage kits—260—\$54,392

**U. S. RUBBER CO.**, Detroit, Mich.  
Repair parts—27,684—\$166,193

**VICKERS, INC.**, Detroit, Mich.  
Pump assemblies—243 ea.—\$205,967

**WARD LAFRANCE TRUCK CORP.**, Elmira, New York  
Crash fire truck—139—\$2,055,163  
Publications for above trucks—1  
Vehicle parts—1,651 ea.—\$56,018

**WEISNER-RAPP CO.**, Farnham Mfg. Div., Buffalo, New York  
Milling machine, airframe, Type A, Type C, Type E—30—\$6,083,385

**WESTERN GEAR WORKS**, Belmont, Calif.  
Gear, final drive output—\$965,357

**WESTINGHOUSE ELECTRIC CORP.**, Philadelphia, Pa.  
Power units—various—\$103,362

**WETMORE HODGES AND ASSOCIATES**, Redwood City, Calif.  
Road test evaluation of ordnance vehicles—\$95,200

**WILLYS MOTORS, INC.**, Toledo, Ohio  
Vehicles and spare parts—52 ea.—\$82,900  
Vehicle parts—27,970—\$42,794

**THE YALE AND TOWNE MFG. CO.**, Yale Materials Handling Div., Philadelphia, Penna.  
Truck, fork lift—9—\$26,971  
Truck, fork lift—7 ea.—\$26,614  
repair parts data—4 lots

## A HANDFUL OF DEPENDABLE POWER...

for your motor-driven products



This motor is representative of the many *specially engineered* Lamb Electric Motors that are giving excellent service in a wide range of products.

The reliability of Lamb Electric Motors results from proper design and careful manufacture, by personnel having many years of experience in the small motor field.

Use of a Lamb Electric Motor frequently results in an improved product and lower costs. May we demonstrate these advantages to you?

**THE LAMB ELECTRIC COMPANY**  
KENT, OHIO

In Canada: Lamb Electric — Division of Sangamo Company Ltd. — Leaside, Ontario



Motor for high-speed grinder.



Aircraft fuel tank valve actuator.

# Lamb Electric

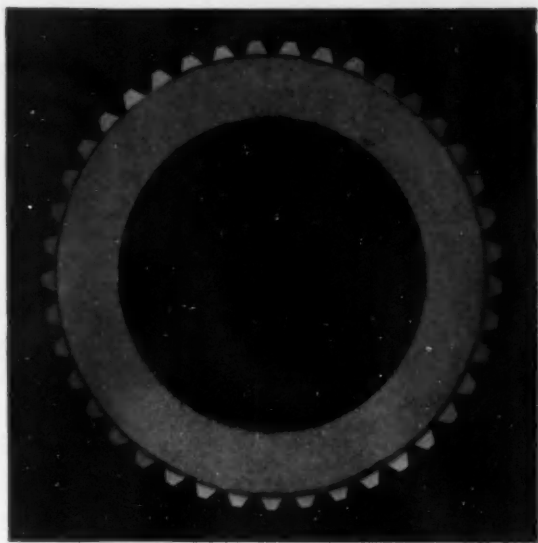
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

## BOOKS...

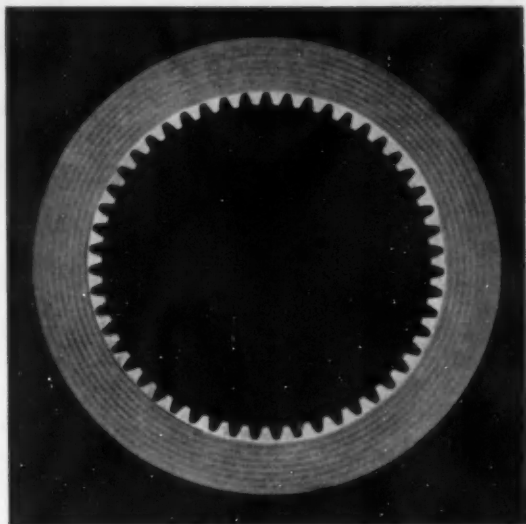
**INDUSTRIAL ENGINEERING TERMINOLOGY**, published by American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. Price, \$1.50. This handy 56-page compendium contains 569 industrial engineering terms arranged in alphabetical order and running from the initial entry, "abnormal reading," through "written standard practice." Definitions are as brief as practicable and can be understood even by non-experts in the field. Subjects range from elementary definitions, such as those for industrial engineering or for a standard itself, to an entire series of complex production terms. There are concise descriptions of the flow process chart and the simo chart, of the Gantt chart as well as the Gantt task and bonus plan, of job classification and evaluation, of process layout and work station. Various instruments such as the marstochron and the kymograph are also included.

**MANUAL OF EXCELLENT MANAGEMENTS**, published by American Institute of Management, 125 E. 38th St., New York 16, N. Y. Price, \$29.99. Automation, the atomic age, and an increasing buyer's market are daily complicating the responsibilities corporate management must discharge, emphasizing what differentiates quality from lesser organizations. Concerned with what constitutes management quality, the American Institute of Management has published this second annual survey, after a continuing review of corporate operations during 1954, a study of companies certified by the Institute as "excellently managed" and the A.I.M. standards for certification. The ten key areas of the A.I.M. Management Audit, by which the Institute has rated 373 American and Canadian companies as "excellently managed," have been widely accepted as including all the functions incumbent upon a management in the performance of its role.





Clutch plates for modern automatic transmissions incorporate semi-metallic facings (above) or non-metallic facings (right), according to manufacturers' specifications.



## for the best in automatic transmissions... moraine friction materials

The range of Moraine friction material formulas is almost limitless. And whether your need is for parts incorporating all-metallic, semi-metallic, or non-metallic friction materials, you can expect more from Moraine . . . because Moraine friction materials meet all the requirements of the application . . . provide superior resistance to heat, wear, and corrosion.

With a long record of performance in Hydramatic, Powerglide, and Dynaflo automatic transmissions, Moraine friction materials are finding new uses in heavy-duty truck

transmissions, in special military vehicles and equipment, in automotive air conditioning, and in household appliances.

Perhaps Moraine's experience and special abilities with friction materials can be of help to you.

*Other Moraine products include: Moraine-400 bearings, toughest automotive engine bearings ever made—M-100 engine bearings and Moraine conventional hi-metal engine bearings—Self-lubricating bearings—Moraine metal powder parts—Moraine porous metal parts—Moraine rolled bronze and hi-metal bushings—Moraine power brakes—Delco hydraulic brake fluids, Delco brake assemblies, master cylinders, wheel cylinders and parts.*



**moraine  
products**

DIVISION OF GENERAL MOTORS, DAYTON, OHIO

# for **HEAVY DUTY** service



## **PEARLITIC MALLEABLE CASTINGS**

The 2-speed truck axle is a *must* under varying load and road conditions because it provides a tailor-made ratio for every condition. But it takes a severe beating under heavy duty conditions encountered in logging, mining, farming, etc.

That's why Eaton Manufacturing Company, leading producer of 2-speed axles, specifies pearlitic malleable — from National — for seven vital parts. For Eaton knows that pearlitic malleable has high ultimate strength . . . resists wear under heavy loads at high

speeds . . . possesses excellent non-seizing properties. In addition, pearlitic malleable can be given a smooth finish . . . can be either liquid or air quenched. And perhaps *most important of all*, pearlitic malleable *machinability index* ranges from 80 to 90 (B1112 steel = 100).

Look your product over critically. Pearlitic malleable castings—from National—can replace costlier fabrication methods . . . can offer opportunities of reduction in weight, machining and assembly time.

AA-1197

*Photos: Courtesy Eaton Manufacturing Company*

## **NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY**

Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

## **Canadian Engine Plant**

(Continued from page 64)

The Cross machine, in particular, is served by a group of 10 Toolometers, two to each principal section. Although theoretically the Toolometer is the watchdog on tool replacement, McKinnon has added a noteworthy wrinkle. Instead of waiting for Toolometers to stop a machine section or station, roving tool setters keep a weather eye open on all calibrating dials, make it a point to replace such tools as are reasonably close to the end of their cycle at the time they are replacing other tools. In short, the tool setters do not wait for a machine to shut down; they replace before the tool is dull. The result of this is that actually a transfer machine section seldom shuts down completely for tool replacement and management prides itself on the fact that down time for this purpose is very slight indeed.

In keeping with GM practice all mechanical equipment has been built to conform with JIC standards. Some of the illustrations will show the arrangement of Vickers hydraulic equipment in neat rows behind machines where maintenance men can work freely. Accessibility to hydraulic mechanism, electric motor drives, control panels, etc., is an outstanding characteristic here.

Good housekeeping predominates in all areas of the plant. It makes not only for good operating economy but contributes to safety and quality workmanship as well.

The foundry operation, virtually under the same roof, provides the engine plant with all the castings required for engine building. This proximity not only is a measure of good operating economy; it also reduces material handling to a minimum, and reduces the hazards of running short during the working shift.

The foundry, let it be noted, is of the most advanced type known to the art today and features mechanization throughout. It produces malleable iron in one section; three types of cast iron in a separate section. Working conditions are exceptionally good, due to the installation of adequate exhaust systems particularly at the cupolas, pouring lines, and shake-out areas. In addition the foundry building has been provided with large doors, extending clear across an entire wall, which can be opened to permit entry of fresh outside air.

# Modernize Today for Profits Tomorrow

## WITH FAST, VERSATILE PRECISION WAY MACHINES



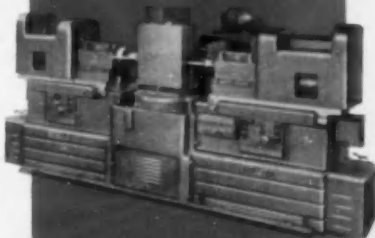
**STYLE 58 TWO-WAY:** Operates from a single push-button station. Handles large, heavy work. Fixture section can be designed to accommodate the way units from any angle.

Units may be re-arranged around fixture or new fixture sections designed for different operations.

**STYLE 54 ONE-WAY:** A standard way unit combined with a fixture unit to suit the work. Large, heavy, and awkward parts, loaded in the fixture, remain stationary; the spindles advance to the work.



**STYLE 54 THREE-WAY:** Standard way units are electrically interlocked to operate simultaneously, or in any sequence. Fast and efficient for machining parts from three directions and holding accurate locations.



**STYLE 58 FOUR-WAY:** Controlled from a central push-button station. Particularly suitable for machining parts from four directions simultaneously, and performing progressive operations.



# EX-CELL-O

## WAY TYPE PRECISION BORING MACHINES ARE PROFIT INSURANCE

Way Machines perform such operations as precision boring, turning and facing. They consist of one or more standard way units combined with a fixture section. Each way unit has its own hydraulic system and controls to operate the spindle slide. Tooling and fixture are added to suit the individual operation. Get details from your Ex-Cell-O representative or write for Way Machine Catalog.

# EX-CELL-O

C O R P O R A T I O N

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES  
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS  
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



## AIRBRIEFS

(Continued from page 98)

Aero Club of Washington. In 1953 about 15,000 aircraft were produced, 11,000 of which were military. Last year (1954) nearly 13,000 were produced, 9600 of these being military planes. This year the estimate indicates a total of 12,000 aircraft with 8500 going to the military. Unless recent or unforeseen developments bring about a change in schedules,

aircraft production will continue to decline toward maintenance levels.

In commenting about Russian airpower, Adm. Ramsey said, "Any people who produced the MIG-15 in the first place could develop something far better. What we (AIA) are interested in is seeing to it that our Army, Navy and Air Force never lack superior planes and guided missiles and related equipment, regardless of what the other fellow has."

He stressed the importance of continuing an aggressive research and development program, regardless of

the day-to-day climate in international relations. After World War II when the U. S. scrapped the greatest airpower on earth and allowed its aircraft industry to wallow in red ink, the Russians stepped up their research and development program, expanded and modernized their aircraft productive facilities, and they have been gaining more momentum ever since.

Looking at it from a scientific point of view, he noted that the number of engineering graduates in the U. S. fell from 50,000 in 1950 to fewer than 20,000 in 1954. In the same period Russia was reversing these figures, graduating 53,000 engineers last year, against only 23,000 in 1950.

We should turn more of our young minds and talents into mathematics, the physical sciences and other fields of engineering and adopt a policy providing for continuity of production of the latest and best air weapons. We should continue a progressive research and development program and thus be prepared to meet the airpower challenge to assure our ability to adequately defend the U. S.

### Twenty-Fifth Anniversary

Lear, Incorporated, of Grand Rapids, Mich., manufacturer of aircraft accessories and instruments, is celebrating its 25th anniversary this year. Lear has continued a progressive policy of developing and marketing new and advanced equipment. It has four operating divisions. The Grand Rapids Division of Lear, Inc., manufactures automatic pilots, automatic approach systems, stability augmentors, stable platforms, gyro indicating systems, and various other types of gyro instrument products, as well as a wide range of electro-mechanical actuators, motors, and automatic flight control systems. The Lear-Romer Division, located at Elyria, Ohio, produces pumps and pressurizing equipment primarily for aircraft and industrial use. The Lear-Cal Division, located at Santa Monica, Calif., manufactures flight controls, automatic pilots and navigational and communication equipment primarily for commercial, executive and private aircraft. The Aircraft Engineering Division and corporate executive offices are in Santa Monica.

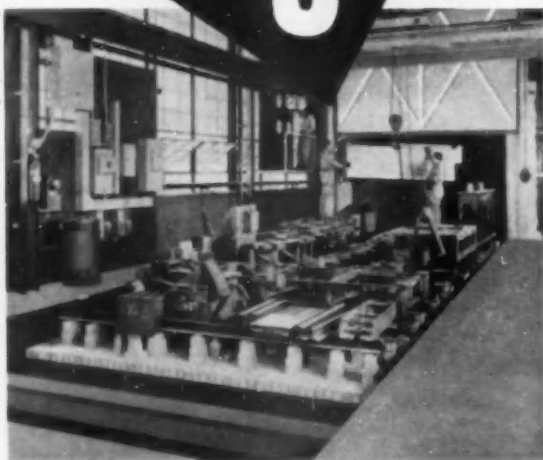
### Orenda Engines

At Malton, Ontario, Canada, located 17 miles northwest of Toronto is a 750,000 sq ft, air conditioned

Announcing Something

the **huge**

**LARGEST**  
normalizing  
and full  
annealing  
furnace in  
any job  
shop west  
of Buffalo



- Capacity 100 Ton
- Handles Parts 40' Long
- Electric Cranes Handle Parts Up to 30 Ton
- Doors Never Opened Until Properly Cooled
- Cooled by Controlled Air Injection
- Completely Automatic
- Electronic Temperature Control Within 2°
- A.I.S.I. Standards

Built expressly for the Jobbing Trade

**NOR-COTE Incorporated**

11425 Timken Avenue • Van Dyke, Michigan

Specialists in Stress Relieving • Normalizing • Spheroidizing  
Shot Blasting • Cold Straightening • Protective Coatings



## How Great Lakes Steel *looks* at quality



SAMPLE "PINS" from heats are sent to a special Quality Control Laboratory where analyses of previous tests by wet chemistry are double checked by spectrograph.



SPECTROGRAPH is used to make doubly certain the finished steel meets the customer's specifications. Here a densitometer reading is made of a spectrogram to determine the percentage of elements present in the steel.

Quality is something you can see in our modern laboratories. In the photograph above a spectrogram is readied for reading in the densitometer—and one more test is underway to help assure quality.

Precision control tests such as this one are applied at every stage of production to assure you the quality of steel required for your product and production methods.

At Great Lakes Steel, the emphasis is on quality and service. Where your production problems involve steel—and particularly flat-rolled steel—we invite you to make them *our* problems. Great Lakes Steel is as close as your telephone.



**GREAT LAKES STEEL CORPORATION**

Ecorse, Detroit 29, Michigan • A Unit of

**NATIONAL STEEL CORPORATION**





## STACKPOLE *Brushes*

... PACING THE TREND

TO **12-VOLT**  
ELECTRICAL SYSTEMS

**STACKPOLE CARBON COMPANY**  
ST. MARYS, PA.

plant which manufactures the only jet engine designed and produced in quantity in Canada. Orenda Engines Ltd., formed in 1946 from the Gas Turbine Division of A. V. Roe Canada, has produced more than 2000 turbojet engines during the past two years.

These engines are used to power the Avro CF-100 all-weather, twin engined interceptor aircraft and the Canadian Sabre V and VI fighter aircraft of the Royal Canadian Air Force. It is claimed that the Sabre VI outperforms the standard model American Sabre Jet.

The Orenda 11 and 14 are the more recent production models. Each is a 10-stage, axial flow compressor type with a two-stage turbine. They develop approximately 7400 lb thrust each.

Flexibility of production is provided in the plant layout and equipment to permit rapid change from one model to the next, or for the manufacture of two or more models concurrently. Rigid inspection and quality control are held to precise standards. Following the accepted aero-engine practice each engine is built twice. Once before a test cell run and again after stripping it for inspection before final test and shipping.

### **Air Conditioned School Teachers**

More than 1000 school teachers representing elementary and secondary schools, junior colleges and universities throughout the United States are attending aviation workshops to become better acquainted with the fundamentals of aviation. Thus, be better prepared to conduct and initiate aviation courses in their own schools.

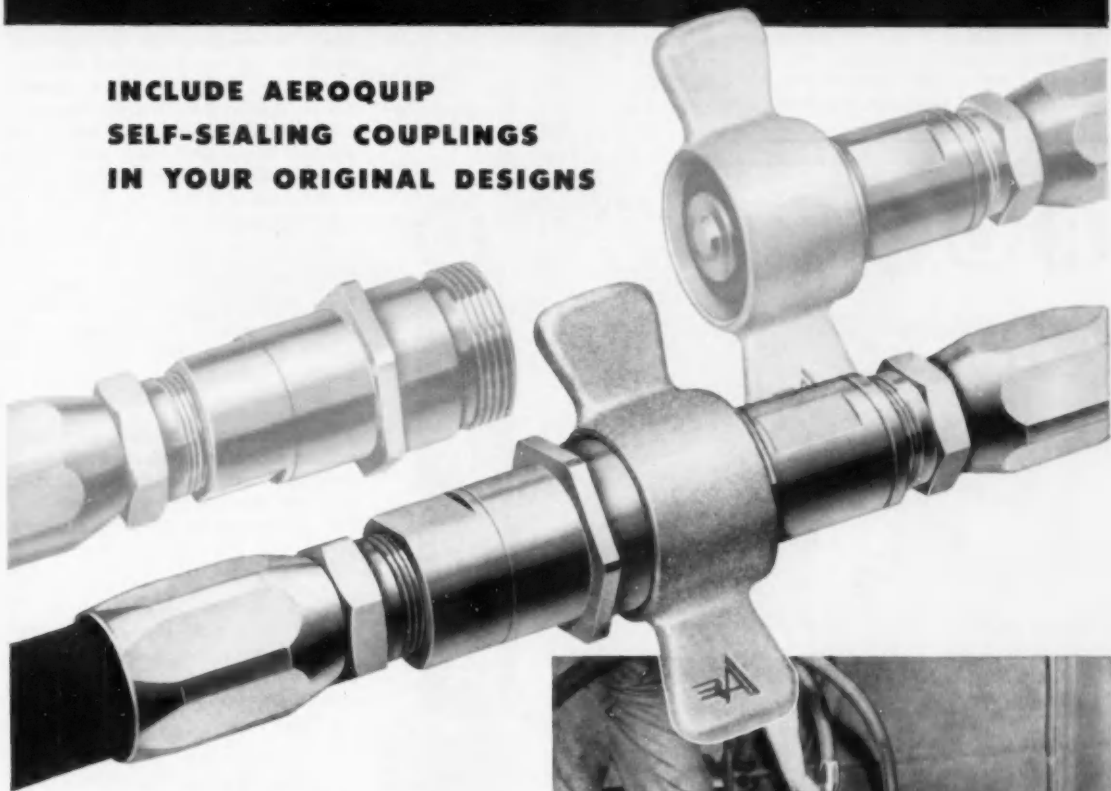
These workshops, 33 devoted to aviation this summer, are sponsored by as many educational institutions in cooperation with the Civil Air Patrol and the civilian auxiliary of the Air Force. Sessions range from one week to more than six. One or more semester hours of graduate and undergraduate credit is given for attendance.

### **Private Plane Delivers**

Utility aircraft shipped to customers in May 1955 increased to 460 compared to the 426 shipped in April. Dollar value of May shipments was \$6,701,000. These figures exclude

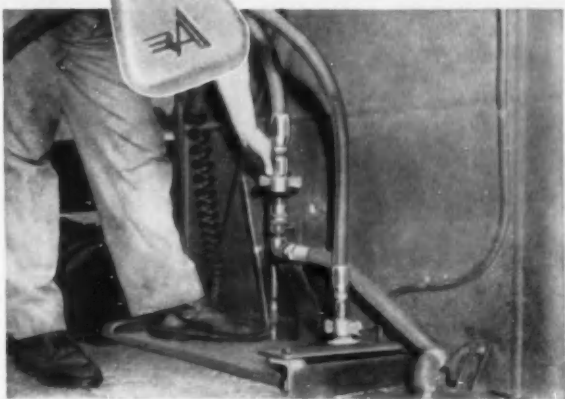
# For Quick, Easy Changes of Attachments Without Bleeding Hydraulic Lines

**INCLUDE AEROQUIP  
SELF-SEALING COUPLINGS  
IN YOUR ORIGINAL DESIGNS**



Avoid the need for two shut-off valves. One compact Aeroquip self-sealing coupling does the job better. Pressurized hydraulic lines may be disconnected and reconnected instantly . . . no fluid gets out . . . no air gets in . . . interchange of hydraulic attachments is quick and easy.

Aeroquip self-sealing couplings are also recommended for air, oils, fuels, coolants and other fluid lines. See your distributor or write us for information.



Aeroquip Self-Sealing Couplings are used to connect and disconnect pressure and return lines between tractor and trailer with hydraulic dump.

 **Aeroquip**  
REG. TRADEMARK

**AEROQUIP CORPORATION, JACKSON, MICHIGAN**

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

aircraft shipped to the Military, helicopters and gliders. Piper Aircraft lead the manufacturers with an even 200, 27 of which were Apache twin-engined planes. Cessna came next with a total of 172, and Beech third with a total of 72, including 12 Twin Bonanza's and eight twin Beech's. Aero Design delivered eight twin engined Commandairs. To complete the list Call Air shipped three planes, Mooney three and Taylorcraft two.

Total of such aircraft shipped from January through May 1955 was 1985.

## ON OUR WASHINGTON WIRE



Companies interested in a new Government publication reporting on Air Force research in various materials fields may buy it from the Office of Technical Services, U. S. Commerce Dept., Washington 25, D. C. Price of the new report (PB 111648) is \$2.75.

Big-scale highway construction has been postponed at least until next year. Despite urgent appeals from Administration to vote a start on the badly needed nationwide road program, House Democrats threw their weight against both the Administration plan for special bond financing and substitute plans calling for special "user taxes."

Two-car families are eyed with more interest by Federal officials. A private concern reports that these families, with incomes averaging \$7000 a year, have high credit standing.

Government will soon buy \$64 million worth of machine tools and facilities for installation in the ship turbine industry as part of the mobilization planning program.

Work on the Government census of business, backed by \$4 million in new funds, has reached the homestretch. First reports should be ready for businessmen this fall.

Engine builders are invited by the Maritime Administration to bid on construction of two closed-cycle propulsion gas turbines to be tested in reserve fleet vessels. One of the units is to be suitable for a ship requiring 6000 normal shaft horsepower, and the second is for a larger ship requiring 12,500 normal shaft horsepower.

Possible Congressional sessions in December will deal with a proposed five per cent national sales tax at the manufacturing level. It would replace present excise taxes, such as those on cars and parts.

Atomic-powered aircraft are just over the horizon, military officials reveal. Pentagon research chiefs disclose that they have assigned the highest military priority to development of A-planes.

# ROCKFORD



## VIBRATION DAMPENING

LIGHT PEDAL PRESSURE

CUSHIONED ENGAGEMENT

VIBRATION DAMPENING

ACCURATE BALANCE

DIRT EXCLUSION

HEAT DISSIPATION

LIFETIME ADJUSTMENT

\* Vibration dampeners in ROCKFORD Spring-Loaded CLUTCHES blot out most of the torsional vibration in car, truck and tractor power transmission lines. The dampener springs are completely housed. Sturdy lugs protect against damage by shock loads and overloading. An adjustable friction nubber controls recoil and provides cushioning action.

### Send for This Handy Bulletin

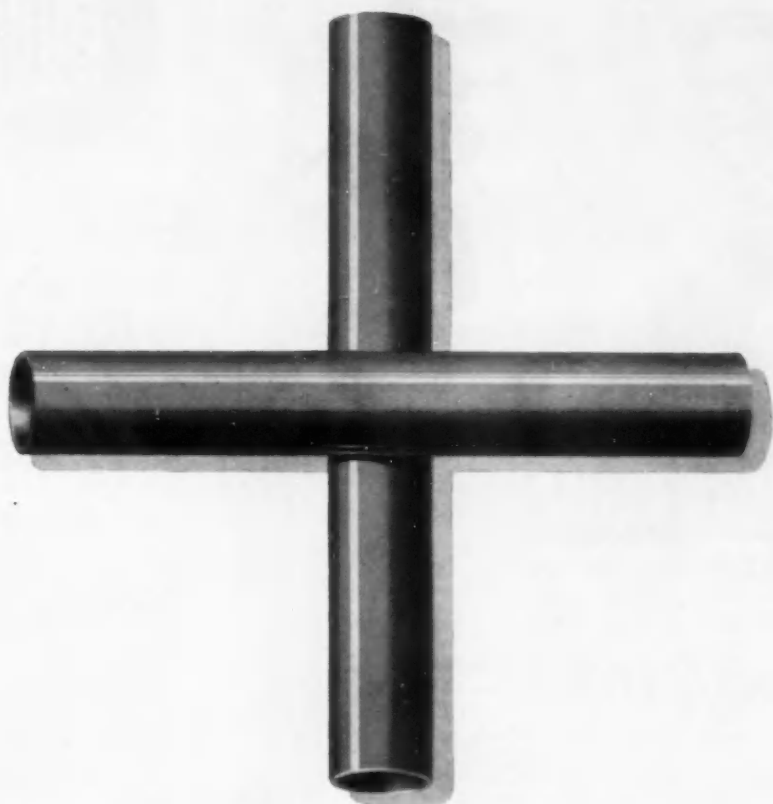
Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION BORG-WARNER  
▲ 315 Catherine Street, Rockford, Illinois, U.S.A. ▲

# CLUTCHES





*The Big Plus in Tubing*

*Remember*

**GM STEEL TUBING**

*By Rochester Products*

GM STEEL TUBING BY ROCHESTER PRODUCTS, DIVISION OF GENERAL MOTORS, ROCHESTER, N.Y.

AUTOMOTIVE INDUSTRIES, August 15, 1955

149

"LET'S **KWIK-CHEK** IT JIM"



**FAST  
ACCURATE**

**KWIK-CHEK**

**A NEW OUTSTANDING METHOD  
IN THE FIELD OF GAGING SMALL  
DIAMETER HOLES**

**PRECISION  
HOLE  
GAGES**



**DIRECT ACCURATE READINGS**  
within 5/10,000 of an inch over entire scale  
**KWIK-CHEK** gives you **QUALITY CONTROL**  
of small drilling and punching operations.  
Reading scale automatically locks at exact  
diameter reading. Eliminates "feel" in-  
accuracy.



**ENGINEERS  
INSPECTORS - FOREMEN**  
Use **KWIK-CHEK** for high precision work,  
fast accurate inspections and labor saving  
methods.



Here's how easy it is to use **KWIK-CHEK**



- ① Release clutch, needle snaps into place.
- ② Insert needle into hole being calibrated.
- ③ Slide barrel down until flush.
- ④ Remove gage and read magnified scale.



Factory  
Guaranteed

**\$110.00  
Set of 3**

Includes leather  
covered case for 3  
gages and precision  
steel setting gage

**KWIK-CHEK GAGES**

are available in 3 models  
#20 Range .025" to .130"  
#30 Range .130" to .255"  
#40 Range .255" to .380"

**\$37.50  
Each**

Includes leather  
covered case and  
precision steel set-  
ting gage

**NEW STANDARD DIVISION**

**U. S. EXPANSION BOLT CO., YORK, PA., Dept. AI-8**

Ask your Jobber for **FREE** Brochure

**SHORTIES**

A jet bomber crew recently made one complete engine change in only 25 minutes—about one-eighth the time it took to change a World War II bomber engine.

The present rate of energy consumption in the U. S. is more than ten times that in 1854. Petroleum supplies almost 64 per cent of all the energy we use.

New discoveries have replaced 25 per cent of all the oil withdrawn and used in the U. S. This does not include the increase of proved reserves in oil fields.

The scheduled airlines of the U. S. flew nearly 2½ billion revenue ton miles of traffic in 1954, a gain of 15.3 per cent over 1953, and more than double the revenue ton miles flown in 1949.

The average motorist now spends 15 per cent more for gasoline taxes than for tires and tubes in driving his automobile 10,000 miles.

One modern U. S. bomber, with a crew of only three, can carry more destructive power in one mission than the combined air forces of all combatants could carry in World War II.

About 75 million Americans will take vacation trips to spots in the U. S. this year, and of these, some 63.750 million will travel by private automobile.

One helicopter can move seven tons of supplies in one hour over a piece of terrain such that it would take about 400 laborers something like 16 hours to do the same job.

Two-thirds of all U. S. males over 13 years of age are drivers.



DoALL COMPANY ENGINEERS GET...

# HIGH STRENGTH

with NO HEAT TREAT DISTORTION

by specifying

**STRESSPROOF®**

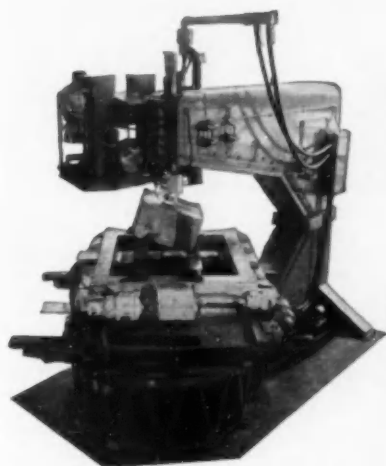
SEVERELY COLD-WORKED, FURNACE-TREATED  
STEEL BARS

on key  
operating parts

The lead and feed screws on the new DoALL Contourmatic must be strong since they transmit power. These important lead and feed screws must also be straight and free from growth and shrinkage, since upon their accuracy depends the accuracy of the huge extrusion dies machined on the saw. STRESSPROOF gives them this strength and accuracy.

STRESSPROOF was specified because it eliminates heat treating and its attendant distortion and warpage problems. In addition, STRESSPROOF wears well, has the necessary strength and is easily machined.

STRESSPROOF makes a better part at lower cost.



The new giant DoALL Contourmatic band saw — the world's largest — is a key part of the Air Force's "Heavy Press Program." STRESSPROOF is used on important operating parts.



Write for helpful data bulletin No. 15... "Improve Quality — Cut Costs"

AVAILABLE FROM LEADING STEEL DISTRIBUTORS  
COAST-TO-COAST

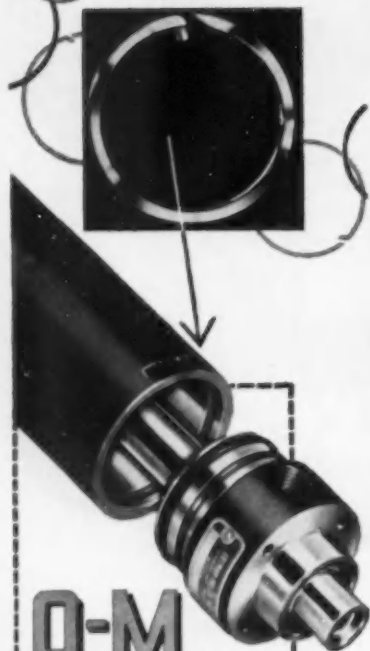


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1438 150th Street, Hammond, Indiana

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faster dis-assembly  
no re-alignment  
problems



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to simpler  
cylinder maintenance

O-M Cylinders save down-time expense and headaches when it comes time to replace packing and seals. SPECIAL INTERNAL-LOCKING KEY is released by rotating end cover, which allows quick, easy removal of cover and rod. And re-assembly is fool-proof. There's only one way to take an O-M Cylinder apart, one way to put it together. Key controls positioning... locks cover securely. No threads to strip. No tie rods and end caps to bolt together. No time-consuming alignment and adjustment problems.

O-M Air and Hydraulic Cylinders are available in a complete range of sizes (1½ to 8" bores), with standard, 2 to 1 or oversize rods. All steel construction with bearing bronze. Completely interchangeable parts. Immediate delivery on many sizes.



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## CALENDAR

OF COMING SHOWS AND MEETINGS

- NICE Symposium on Electronics and Automatic Production, San Francisco, Calif. .... Aug. 22-23
- Western Electronic Show and Convention, Civic Auditorium and Fairmont Hotel, San Francisco, Calif. .... Aug. 24-26
- International Ignition Conference, Scintilla Div., Bendix Aviation Corp., Sidney, N. Y. .... Aug. 24-26
- General Motors Powerama, South Lake Shore Drive, Chicago, Ill. .... Aug. 31-Sept. 25
- National Aircraft Show, International Airport, Phila., Pa. .... Sept. 3-5
- AMTDA Annual Meeting, Blackstone Hotel, Chicago, Ill. .... Sept. 5-6
- Farnborough Air Show, England .... Sept. 5-11
- NMTBA Machine Tool Show, International Amphitheater, Chicago, Ill. .... Sept. 6-17
- Production Engineering Show, Navy Pier, Chicago, Ill. .... Sept. 6-17
- Coliseum Machinery Show, Chicago, Ill. .... Sept. 6-17
- SAE Golden Anniversary Tractor Meeting and Production Forum, Hotel Schroeder, Milwaukee, Wis. .... Sept. 12-15
- Instrument Society of America, 10th annual Instrument-Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles, Calif. .... Sept. 12-16
- National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J. .... Sept. 14-16
- National Industrial Packaging and Materials Handling Show, Kingsbridge Armory, New York, N. Y. .... Sept. 20-22
- ASME Annual Meeting, Roosevelt Hotel, New Orleans, La. .... Sept. 25-29
- First Trade Fair of the Atomic Industry, Sheraton-Park Hotel, Washington, D. C. .... Sept. 24-30
- AIEE and IRE Industrial Electronics Conference, Engineering Society Auditorium, Detroit, Mich. .... Sept. 28-29
- AIEE National Electronics Conference, Chicago, Ill. .... Oct. 3-7
- AIEE Fall General Meeting, Hotel Morrison, Chicago, Ill. .... Oct. 3-7
- World Plastics Fair and Trade Exposition, National Guard Armory, Los Angeles, Calif. .... Oct. 5-9
- Paris Automobile Show, France .... Oct. 6-16
- SAE Golden Anniversary Aeronautic Meeting, Production Forum, and Engineering Display, Hotel Statler, Los Angeles, Calif. .... Oct. 11-15
- National Metal Exposition, Convention Hall, Philadelphia, Pa. .... Oct. 17-21
- International Motor Show, Earls Court, London, England .... Oct. 19-29
- AGMA Semi-annual Meeting, Edgewater Beach Hotel, Chicago, Ill. .... Oct. 23-26
- Canadian Industrial Tool and Equipment Show, Montreal, Canada .... Oct. 24-28
- ASME-IME Joint Conference on Combustion, London, England .... Oct. 25-27
- ASRE Annual Technical Convention, Detroit, Mich. .... Oct. 26-28
- Automobile Old Timers, 16th anniversary dinner Waldorf-Astoria Hotel, New York, N. Y. .... Oct. 28
- SAE Golden Anniversary National Transportation Meeting, Hotel Chase, St. Louis, Mo. .... Oct. 31-Nov. 2

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H-4

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The finest performance in the world is built into American cars—with the help of precision-made sleeve bearings. They are asked to carry the thrust loads of pistons, endure extreme heat, protect the crankshaft and maintain internal lubrication. Their dependability is assured under the most severe load and road operating conditions. We are specialists in quality bearings and bushings for engine, transmission and chassis applications, and a major supplier to the car-building industry. Federal-Mogul Corporation, Detroit 13, Michigan.

**FEDERAL-MOGUL**

**SINCE 1899**



# Recent Developments in Optical Tooling

(Continued from page 52)

establishing stations along the length of the jig.

Planes normal to the line of sight are established by means of the auto-reflection principle with the optical square.

Latest innovation at Douglas is the use of a small television camera, on a closed circuit, instead of an observer at the eyepiece of the micro-alignment telescope.

The jig builder focuses the micro-alignment telescope for twice the range of his optical square and observes the auto-reflected image on the 17 in. television receiver. By adjusting the four levelling screws and the plate tangent screw of the optical square, as shown in Fig. 2, the auto-reflected image of the telescope objective lens reticle, out of photograph at left, may be centrally superimposed on the cross hairs of the telescope. The image on the television receiver appears as is shown in Fig. 4. When this is done, the axis of the optical square telescope is 90 deg to the line of sight and may be used to transit a station plane.

With such a system, the jig builder adjusting the optical square observes his own adjustments which eliminates the need for hand signals. The use of auto-reflection, which halves the angular error of a direct reading, is retained. An image large enough to be seen by each of several crews of jig builders is produced on the screen of the television receiver; hence, eyestrain is eliminated. An enlargement of the reflected image of approximately 300 diameters increases the accuracy in superimposing the image over the cross hair reticle. A simultaneous observation may be made by the jig builder and tool inspector. The basic principle of our optical square is not altered; i.e., each optical square of a battery mounted on a major assembly jig may be planized by observations "over" or "by" the other optical squares. Best results have been obtained with the use of eccentrically mounted mirrors which eliminate the need of sighting through partial mirrors or optical flats. (Fig. 5.) Installation of the television camera bracket designed by Douglas

requires only two tapped and two dowel holes in the basic structure.

The adaptation of closed circuit television is not only applicable to optical tooling in the tooling division but also has provided an accurate and efficient means for the maintenance division to set and adjust the optical instruments which are used and which are periodically serviced. The most common method at Douglas of rigging jig details in a station plane is to rig a photo-copy of a master layout (MLO) on a facility gage. This, in turn, is oriented in a station plane by pin-pointing the center of one target on the line of sight and the center of the other target on the optical reference plane which has been established by the auxiliary line of sight.

Douglas-designed devices permit the rigging of hinge fittings to skewed hinge lines, using the latter as lines of sight.

After the jig is completed, protective covers are installed over the mounting bases.

The optical tooling system, using the precision check bar, was developed in 1951, and used extensively on the DC-7 assembly tooling program in 1952. The use of the closed circuit television was developed for tooling for the Douglas DC-7C.

## Feeling the profits squeeze...

... Because today's market demands lower manufacturing costs? And yours aren't low enough?

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Our production engineers, specialists in all phases of industrial engineering, find and correct those factors in your plant that contribute to excessive manufacturing costs.

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## BOOKS...

**PROFIT MANAGEMENT AND CONTROL**, by Fred V. Gardner, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Dealing with practical applications of profit graphs and the break-even point, the book offers a new approach in coordinating capital graphs and profit graphs and tying them in to the fundamental balance sheet and profit and loss statements.

**COMPANY PRACTICES IN EMPLOYEE TRANSFERS AND RELOCATION**, published by American Management Association, 330 W. 42nd St., New York 36, N. Y. Price, \$1.50. Expansion and development in American industry since World War II, along with consolidation and adjustment to economic change, have produced a noticeable increase in the number of families reestablishing homes in new communities. The long-distance moving companies say that the largest single group among their customers consists of corporation employees who are being transferred. This report examines the situation (a growing concern of management) to determine current personnel practices and establish what assistance management is giving to employees to defray costs in mass moves and individual transfers.

## How to simplify your design...

### One good way is to specify stainless steel

Specify stainless not only for trim and accessories but for structural members as well.

Or for combinations of both. (Beautiful, durable stainless structural members can often serve as trim themselves.)

Stainless steel is strong, tough, corrosion resistant. It can be polished satin-smooth or mirror-bright. It can be economically machined, formed or fabricated.

Stainless, in short, is the ideal means to finer automobile design at lower unit cost.

Make it easy on yourself—more attractive to your customers. *Make it stainless.*

Producers of alloys



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### VANADIUM CORPORATION OF AMERICA

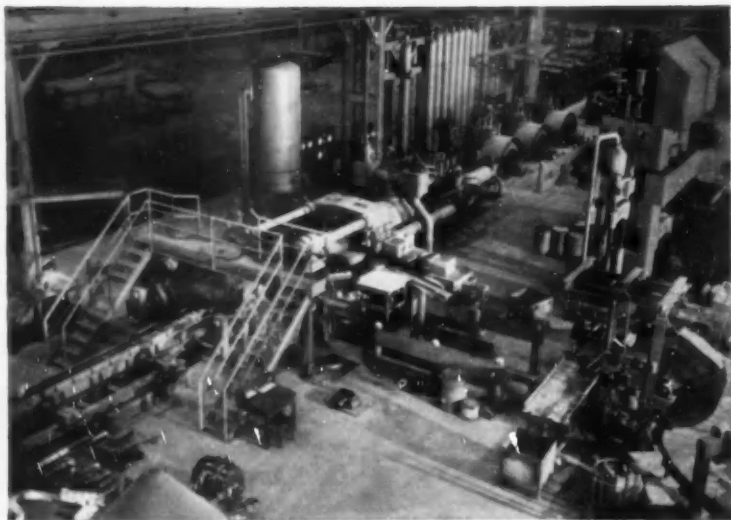
420 Lexington Avenue, New York 17, New York  
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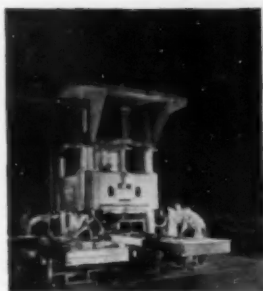


**DRAWING**

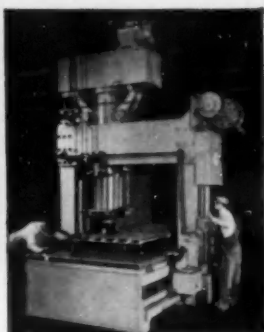
From a single press to a packaged installation . . .



**PACKAGED INSTALLATIONS**



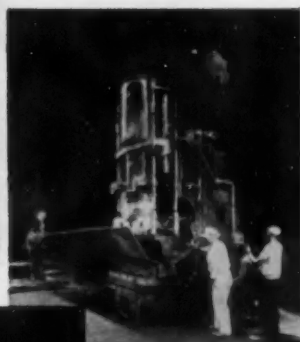
**RUBBER PAD FORMING**



**STRAIGHTENING**



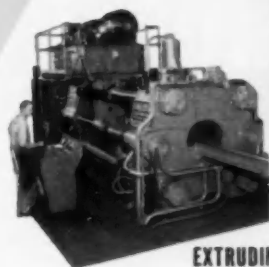
**FORMING**



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*At the Show...*

**See  
Stainless Bored  
at Better than  
7" per Minute!**

*on the New LeBlond-Carlstedt  
Rapid Borer*



**W**ith the new LeBlond-Carlstedt Rapid Borer, you can bore, trepan or counter-bore holes 3 to 8 times faster than by the conventional D-bit method! We'll prove this at the Machine Tool Show. You'll see a 1½" hole bored in solid Stainless 303 at better than 7" per minute. We'll bore 4140, C-1141 and 6150 even faster!

The Rapid Borer was developed expressly to accommodate revolutionary new tooling which cuts at very high speed with excellent accuracy and finish. Cutting oil is forced between the boring bar and hole wall forming a continuous bearing. It flushes back through a hole in the boring head and bar, carrying away the chips as it goes. Chip form is controlled both by tool angles and proper feed and speed combinations; thus tool faces are kept clean and chip passage clear. Cutter design produces balanced cutting pressures thereby controlling concentricity.

This new tooling requires a machine with the following characteristics, all of which are incorporated in the Rapid Borer's design:

*High spindle horsepower*

*Ample rigidity throughout*

*Complete absence of vibration at all speeds*

*Infinitely-variable feeds (up to 38" per minute), independent of speeds, while running under load*

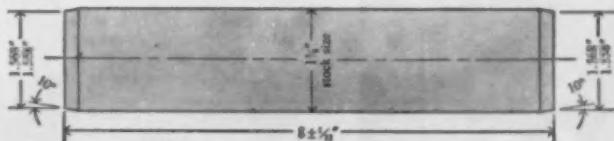
*Final drive to spindle through belts*

*Large volume of cutting oil*

Basically, the Rapid Borer is suited to work that is symmetrical for balance in rotation—round, square, octagonal, tapered or stepped. A wide variety of hole diameters and depths as well as work sizes can be accommodated.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, we'll show you how to produce them faster than ever before.

*Like to see your own materials bored at the show?*



Just prepare sample bars of the materials you are now boring, or intend to bore. Make them according to the drawing here. Bring them to the Show and we'll bore them for you on the Rapid Borer.



See it at the show. No. 1313—dead center of the new exhibition hall.

*...cut with confidence*

The R.K. LeBlond Machine Tool Company

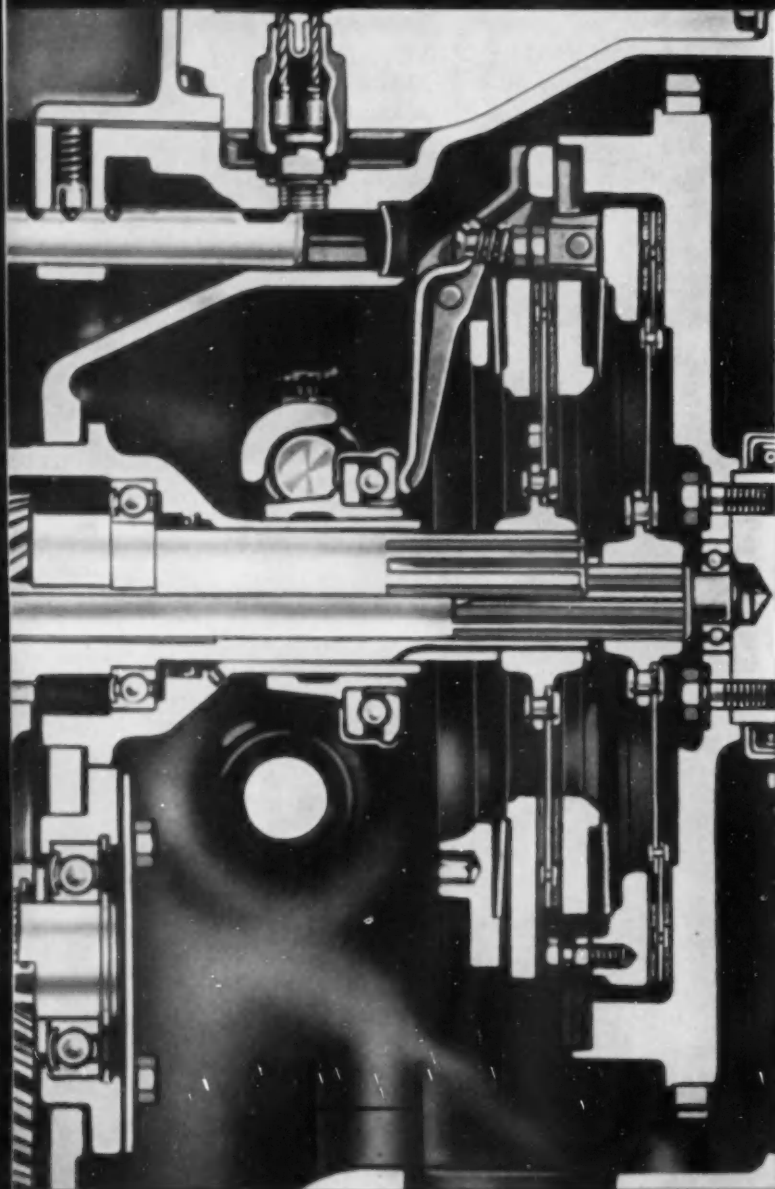
Cincinnati 8, Ohio

*World's largest builder of  
a complete line of lathes for  
more than 68 years*

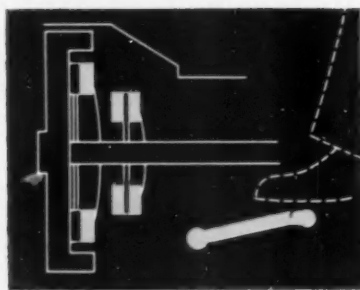


# DANA ANNOUNCES NEW

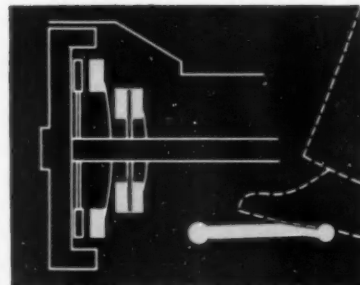
*Gives Operator ONE-PEDAL Control of*



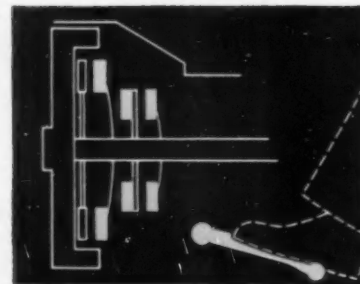
The "2-Stage Clutch with the Built-In Feel" designed by Spicer for the Ferguson 35



1. Both transmission and power take-off are fully engaged when clutch pedal is up.



2. Pedal half way down disengages transmission only. PTO continues to operate.



3. Pedal all the way down disengages both transmission and PTO.

**DANA CORPORATION • TOLEDO 1, OHIO**



# Spicer

# TRACTOR CLUTCH

## *Both Transmission and Power Take-Off!*

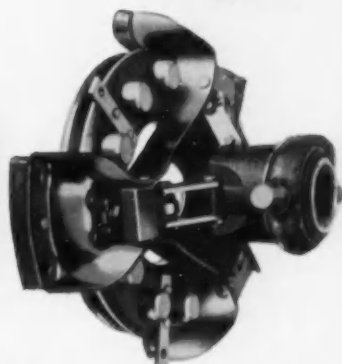
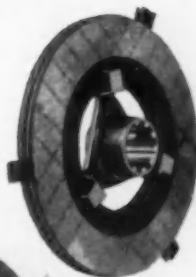
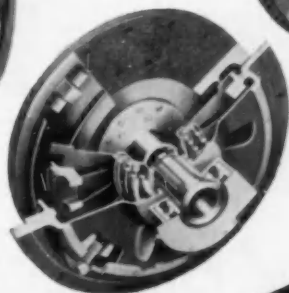
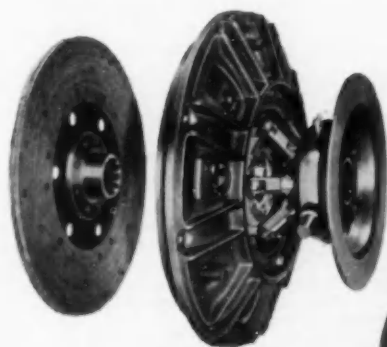
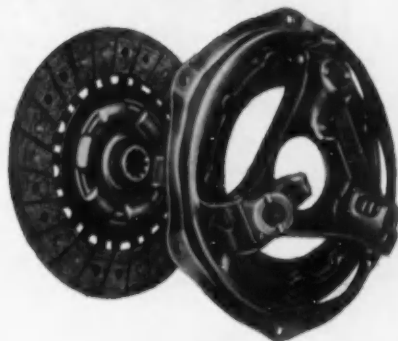
**T**his new Spicer Clutch . . . developed by Dana engineers for the Ferguson 35 Tractor . . . assures farmers of increased safety and efficiency. They can operate such machines as the baler, mower, corn picker, forage harvester continuously regardless of tractor starts and stops.

Since the left foot of the operator gives complete control over both tractor motion and PTO, both hands are entirely free for steering, gear changes, and other driving requirements. See details of clutch mechanism and operation at left.

This new 2-Stage Clutch is another engineering advancement made possible by the wealth of Spicer experience in power transmission problems, and by research and development facilities unexcelled in the industry.

The Dana Corporation offers clutches of many types for automotive, tractor and industrial power transmission needs. These clutches embody advancements and exclusive features that assure outstanding performance in the field.

Ask Spicer engineers to help solve your particular power transmission problems.



# Spicer

**SPICER PRODUCTS:** TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER AND AUBURN CLUTCHES • PARISH FRAMES

# RUGGED!



Built by Chrysler Corporation  
Delaware Tank Plant

## ...heating systems chosen for newest Patton "48" medium tanks!

When the going is rugged, dependable heating is a must. That's why South Wind was the Ordnance Corps choice for the newest Patton Medium Tank for personnel heating. This same rugged dependability is an integral part of every South Wind Heater for whatever purpose.

Further, South Wind offers all three basic heating needs for vehicles in one heater.

**1. Engine pre-Heating.** Answers needs of all types of engines, all pre-heating requirements. Floods engine components, battery, crankcase, carburetor with fresh, heated air. Makes starting easier, faster — even at 65° below!

**2. Personnel Heating.** Fresh, hot air, independent of engine heat, independent of engine operation, circulates swiftly, evenly, to keep personnel comfortable and at peak efficiency at all times.

**3. Windshield Defrosting.** Keeps windshield reliably "frost-free." Assures clear vision, safer driving.

Two of these 30,000 BTU Heaters—  
Model 1030-D are standard on the  
Patton—



**South Wind**  
RED. W. & PAT. OFF.  
**ENGINE AND EQUIPMENT PRE-HEATING  
WINDSHIELD DEFROSTING  
PERSONNEL HEATING**



### FACTS FOR THE ENGINEER WITH A HEATING PROBLEM

Data given are typical for the 30,000 BTU heater  
— data for other sizes provided upon request.

**ENVELOPE**—Can be fitted into a space 19" x 10" x 7".

**FUEL**—Will operate on automotive, aircraft, kerosene and jet fuels with fuel pressures of from 1 to 15 lbs.

**VOLTAGE**—Available for 12 and 24 volt systems.

**POWER REQUIRED**—For 12 volt systems—approximately 245 watts starting and 110 watts running. For 24 volt systems—approximately 365 watts starting and 144 watts running.

**INSTALLATION**—Bracketry available for installation in most operating positions.

**ACCESSORIES**—Inlet and outlet adapters, fuel pump, power control, wiring harness, exhaust and vent ducts are engineered and provided to suit your particular application.

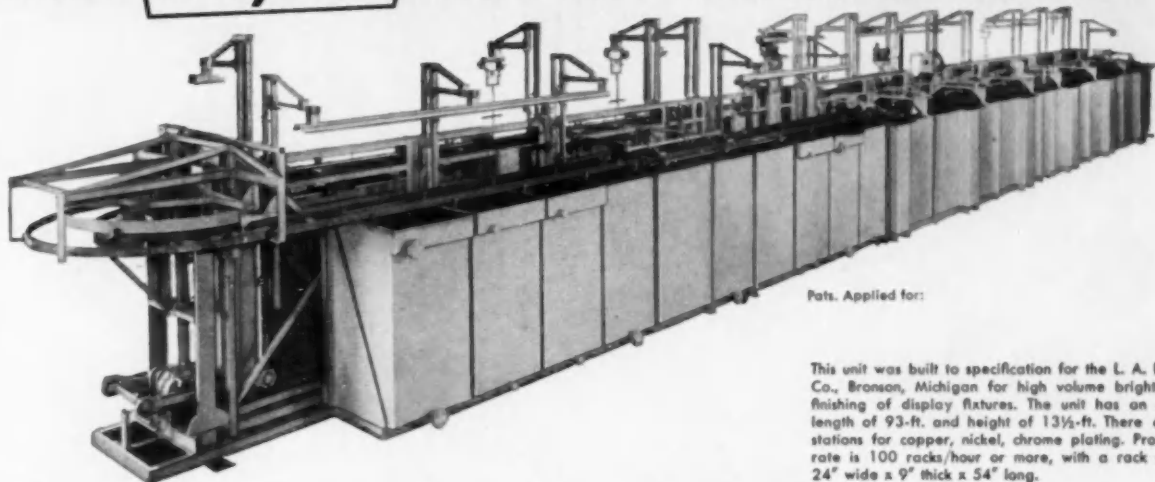
**SAFETY CONTROLLED**—Eliminates ignition hazards. Has time-proven safety devices for most extreme temperatures.

**EASILY MAINTAINED**—All parts and components readily available for service. Blower design provides cooling for motor for longer life.

### There's a South Wind Heater for every heating need

Do you have a heating problem? Write today for the experienced counsel of South Wind field engineers on any problem in internal or external pre-heating or space heating. The wide range of South Wind Heaters includes 20,000—30,000—50,000—100,000—200,000 and 600,000 BTU/hr. capacities. Write South Wind Division, Stewart-Warner Corporation, 1514 Drovers Street, Indianapolis 7, Indiana.

# ONLY *Wagner* BROTHERS CAN OFFER YOU THIS



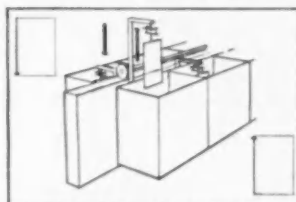
Pats. Applied for:

This unit was built to specification for the L. A. Darling Co., Bronson, Michigan for high volume bright metal finishing of display fixtures. The unit has an overall length of 93-ft. and height of 13½-ft. There are 27 stations for copper, nickel, chrome plating. Production rate is 100 racks/hour or more, with a rack size of 24" wide x 9" thick x 54" long.

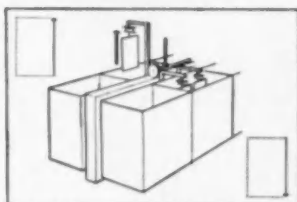
## Revolutionary Concept in plating automation...

The Wagner Brothers Automatic is a complete and fully automatic mechanism, incorporating a revolutionary vertical transfer and return type work conveying principle which eliminates elevating superstructure, transfer cams, chains and

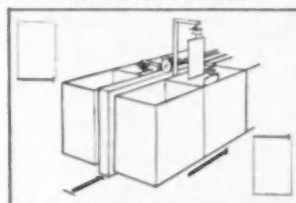
sprockets and hydraulic cylinders above tanks. Many unique design features combine to make this mechanism a smooth operating, perfectly timed unit requiring less than ½ the power of comparably sized units.



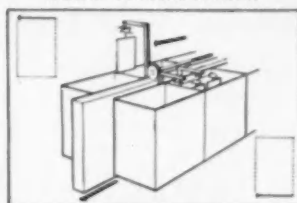
FIRST VERTICAL MOTION



SECOND VERTICAL MOTION



FIRST HORIZONTAL MOTION



SECOND HORIZONTAL MOTION

### ADVANTAGES

**SMOOTH OPERATION**—Operates so smoothly that you can balance a full water glass on the transfer mechanism throughout the entire plating cycle. Obviously such smooth operation will save you time now spent salvaging parts from tanks; dropped there because of the jolting transfer action of ordinary machines. This smooth, positive performance is accomplished because of our hydromotor principle which makes each start and stop gentle as a breeze.

**LOW POWER REQUIREMENTS**—Powered by one 10 hp motor, this installation uses less than half the power required by comparably-sized units. This is possible because of the almost perfect balance of work load being lifted at one time.

**SIMPLE INSTALLATION**—Your Wagner Brothers Automatic is delivered to you, either intact or in two or three completely assembled sections, depending upon size. Installation is simply a matter of positioning and leveling.

**MINIMUM OF MAINTENANCE**—There are few moving parts to wear,

no vibrating parts, no backlash in automation, nor little chance of misalignment. Overload protection is given by a by-pass in the hydraulic pump. All working parts can be reached for adjustment without disassembly.

**OTHER PLUS FEATURES**—Wagner Brothers Automatics require a minimum of space. The model illustrated uses 54-inch racks and operates under a 13½-ft. ceiling. There are no greased parts or hydraulic fittings over tanks where dripping oil could contaminate solutions. Triple contacts on cathode bar; afford consistent, uninterrupted current flow. Automatic heat control system gives simple, foolproof regulation of temperature for accurate results. Centralized lubrication can be provided as an optional feature. Drag and dwell times are easily varied with this unit. **Write for free, illustrated folder.**

In addition to high-volume plating, the Wagner Brothers' Automatic is equally well-suited to anodizing (sulphuric and chromic), phosphate coating, etching, electropolishing, oxide coating.

### HOW IT WORKS

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements are used to bring parts through the full plating cycle; one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station. When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transferred and lift them at all transfer points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. This sequence is simultaneously produced in reverse on the opposite side so that, when the lifting arms are being lowered on one side, they are raised on the other side.

YOUR PRIMARY SOURCE FOR PLATING AND POLISHING EQUIPMENT AND SUPPLIES

*Wagner*

**BROTHERS, INC.**

437 MIDLAND AVE. • DETROIT 3, MICHIGAN



## This fellow can put muscle in **ALL** your **ADVERTISING**

This man, the U.S. postman in your community, can be the most effective outside salesman in your car dealership. Just ask him to deliver *your* personalized direct mail advertising . . . and he'll make *all* of your advertising hit harder.

For this man leaves *your* sales message right at the doorsteps of your best local prospects and customers.

Your direct mail is prepared with a sure professional touch by your factory . . . by its advertising agency . . . and by its direct mail specialists. Yet, to your local prospects, it is *your exclusive* advertising, pin-pointed to *your* market.

Your company's tremendous *national* advertising creates a desire for your product. Back up that support by telling your local market *where* to buy. By delivering your factory's direct mail program to *your* best prospects, your U.S. postman gives your advertising dollar real muscle.

Note to Automotive Manufacturers:  
This advertisement is one of a series  
now appearing in dealer publications.

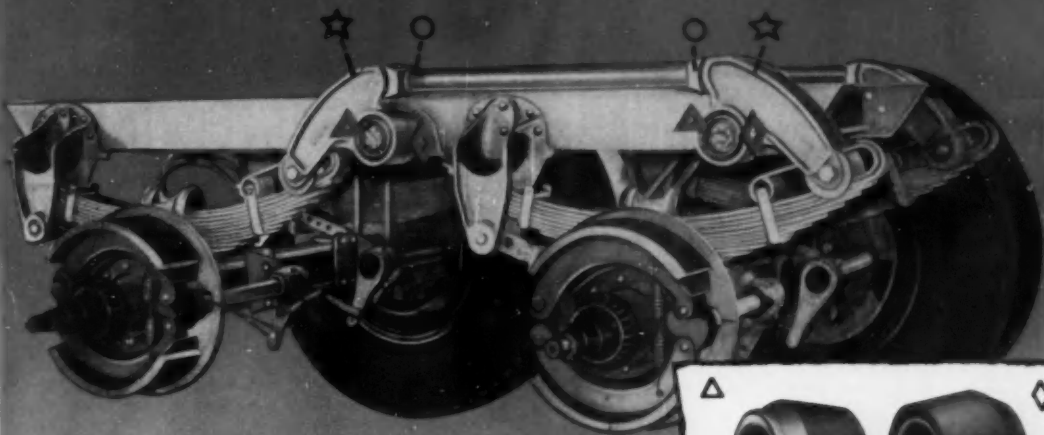


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ANOTHER SPECIAL PROBLEM SOLVED BY LORD

## ...THE CASE OF THE **DIFFERENT TANDEM**



Here's a case where LORD engineering and know-how, in cooperation with Fruehauf Engineers, have helped provide trailer owners with a tandem unit that *never* requires lubrication!

In addition to having a lower initial cost, the LORD units used in the new Fruehauf Rubber-Ride tandem eliminate lubrication and reduce operating wear and maintenance costs to an almost negligible point.

The load distributing mechanism on this outstanding tandem uses 16 LORD units to absorb shock and to eliminate damaging friction at points of contact.

This is but one example of the many important vibration control solutions contributed by LORD to the transportation industry. Take advantage of the unexcelled LORD facilities for research, engineering, and precision production. They are available in the field offices or the Home Office upon your request—to produce the *one best* solution to your specific vibration control problems.

LOS ANGELES, CAL.  
Hollywood 4-7583  
PHILADELPHIA, PENNA.  
LOcust 4-0147

DALLAS, TEXAS  
PInespect 7996  
DAYTON, OHIO  
MICHigan 0871

DETROIT, MICH.  
TInity 4-2060  
CHICAGO, ILL.  
MICHigan 2-6010

NEW YORK, N. Y.  
CIRCLE 7-3326  
CLEVELAND, OHIO  
SUperior 1-3242

**LORD MANUFACTURING COMPANY • ERIE, PENNSYLVANIA**

DESIGNERS AND PRODUCERS OF BONDED RUBBER PRODUCTS

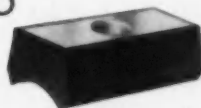
SINCE 1924



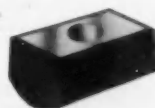
Lord J-6220-3 Center Bonded units used on the outside joints of the trunnions.



Lord J-6220-4 Center Bonded units used on the inside joints of the trunnions.



Lord J-6221-2 Flat Bonded Long Pads used on the connecting rods.



Lord J-6222-1 Flat Bonded Rebound Pads used on the connecting rods.





**EXTRA**

VOL. 2

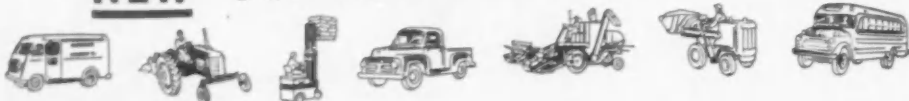
# Mobile Equipment News

VICKERS INCORPORATED, DETROIT, MICHIGAN

**EXTRA**

NO. 6

## NEW—For Smaller Vehicles



## VICKERS HYDRAULIC POWER STEERING

**SERIES S22 BOOSTER**

### LOW COST

Vickers Series S22 is a new, streamlined steering booster built especially for smaller vehicles. The design permits significant production economies . . . and these economies are passed on to vehicle manufacturers.

### SUPERIOR PERFORMANCE

The Series S22 has excellent operating characteristics . . . providing smooth, easy, fingertouch steering under all conditions. Obstructions, chuck holes, blown tires, etc. cannot spin the steering wheel or jerk it out of control on vehicles equipped with this Booster. Safer in traffic . . . on the farm . . . in the plant.

### SIMPLIFIED DESIGN

Servo valve is simplified and smaller. Ease of servicing is another advantage.

### EASY INSTALLATION

Oil connections can be placed in any one of four positions (90° apart) with respect to ball stud. This and the compact design make installation exceptionally easy and reduce its cost.

### NEEDS LESS SPACE

Design is unusually compact and streamlined. Series S22 will go into a minimum space and usually requires little or no linkage change.

### DEPENDABLE

All the "know-how" acquired in

Vickers more than 25 years experience with hydraulic power steering has gone into the design and manufacture of the Series S22. Vickers hydraulic equipment of all kinds has a remarkable record of dependability. This booster is no exception.

### ASK FOR NEW BULLETIN

A new bulletin gives more information on the Series S22 together with appropriate Vickers Pumps and typical circuit diagrams. Send for Bulletin M-5107.

For heavier steering applications and longer piston strokes, use Vickers Booster Series S23 (see Bulletin M-5106) or Model S6-315 (see Catalog No. M-5101).

## VICKERS Incorporated

DIVISION OF SPERRY RAND CORPORATION  
1428 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices ATLANTA • CHICAGO AREA (Brookfield)  
CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES  
AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Summit, N.J.)  
PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon)  
ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley)  
SEATTLE • ST. LOUIS • TULSA • WASHINGTON • WORCESTER

## VICKERS, SERIES VT16

### VANE TYPE PUMP



This is the pump normally used with the Series S22 Booster. It has integral volume control and relief valve, and oil reservoir. The vane type design delivers more oil with less power. Automatic wear compensation and hydraulic balance contribute to much longer life with minimum maintenance. No-load starting is another advantage in cold weather.

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

7179

# For Uniform Heat Treat Response



Photo courtesy The Alliance Drop Forging Co.

● Youngstown Hot Rolled Alloy Bars assure uniform response in our customers operations because such uniformity starts at the Ore Mines. At every operation, in Youngstown's completely integrated steel manufacturing facilities, rigid quality controls make certain that uniform chemistry, physical properties and dimensions are furnished.

SPECIFY

# Youngstown

Hot Rolled



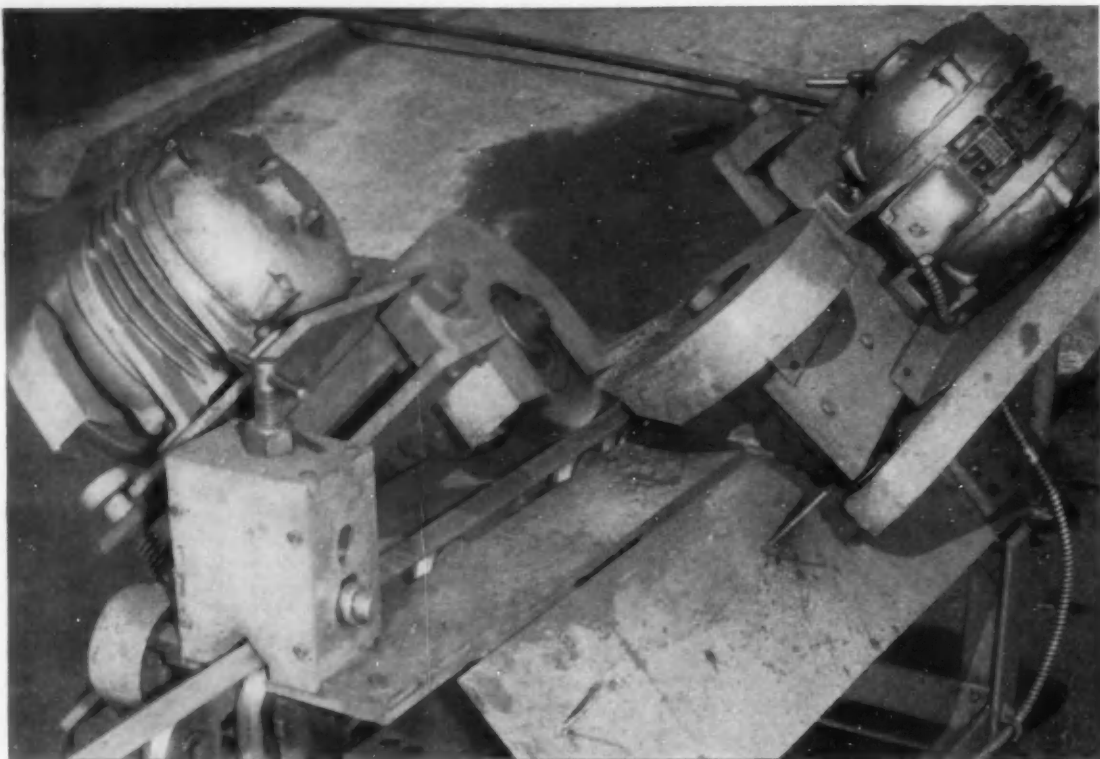
Alloy Bars

## THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of  
Carbon, Alloy and Incoloy Steel

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT  
AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE -  
HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES



## **FAST PASS STRIPS SCALE** to save money on material!

*A cost-reducing idea an OBA can duplicate in your plant*

This manufacturer takes advantage of a price differential by buying a grade of angle iron that still has mill scale on it.

**The Problem:** How to remove this hard scale and still save money over purchasing a more costly grade of steel that has been pickled.

**Here's what they do:** The angle iron bars are fed through a simple brushing machine against two Osborn Master® Wheel power brushes. In one pass, these Osborn Brushes effectively remove the hard, flint-like scale . . . at a rate of 150 feet a minute.

The strips come clean, ready for production.

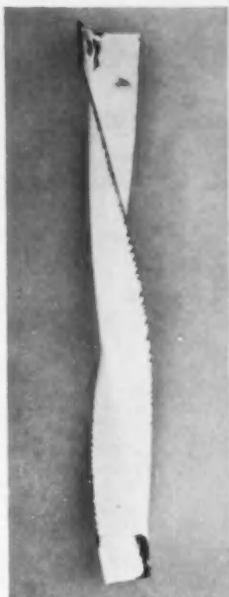
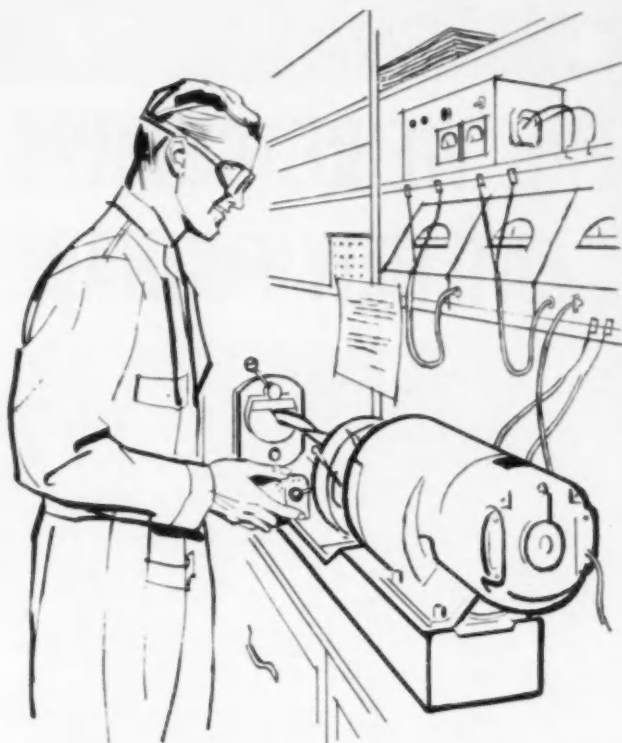
You benefit many ways by having an **Osborn Brushing Analysis** made of your cleaning and finishing operations. You can improve the quality of your product, automate your methods and cut manufacturing costs. Write us about an **OBA**. The Osborn Manufacturing Company, Dept. E-32, 5401 Hamilton Ave., Cleveland 14, Ohio.



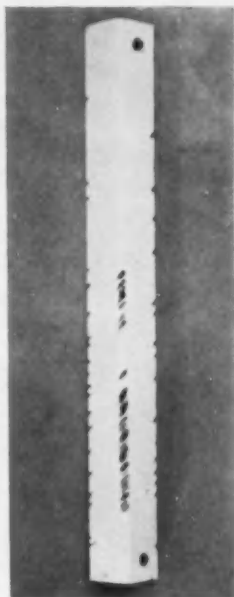
# Osborn Brushes®



BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES  
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



Enameling iron, with 1 coat of porcelain enamel over Parker Pre-Namel 410, was twisted 255° before enamel fractured.



Enameling iron, with conventional 2-coat system of porcelain enamel, fractured badly when twisted only 70°. (Twisted less than its elastic limit, metal returned to its original shape).

## NEWS OF A REVOLUTION *that's about to happen!*

Porcelain enameling on steel has always been a preferred finish. However, its use has been limited by cost and by difficulties in the processing.

Now, a big change is about to take place. It is coming about through a cooperative effort that we feel should be acknowledged.

First, Parker Rust Proof Company's research discovered and developed a surface treatment for steel which permits the application of the porcelain enamel finish coat directly to ferrous metals, reduces cost, improves quality and eliminates many production difficulties in porcelain enameling. For production evaluation, Frigidaire Division of General Motors and Pemco Corporation

entered the effort with pilot runs and production tests.

The new treatment, making use of Parker Pre-Namel 410, has been shown to simplify porcelain enameling, achieve high quality uniform results, reduce use of frit, produce a more durable finish. Savings of from 1 to 3 cents per square foot of enameling surface are indicated.

We gratefully acknowledge the help we've had from Frigidaire and Pemco. Here is another instance of companies in diverse lines cooperating in a development program today which should benefit hundreds of manufacturers and millions of their customers in the future.

\*Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.

Since 1915—Leader in the Field



# PARKER RUST PROOF COMPANY

2178 E. Milwaukee, Detroit 11, Michigan

**BONDERITE**  
corrosion resistant  
paint base

**BONDERITE and BONDERLUBE**  
aids in cold forming  
of metals

**PARCO COMPOUND**  
rust resistant

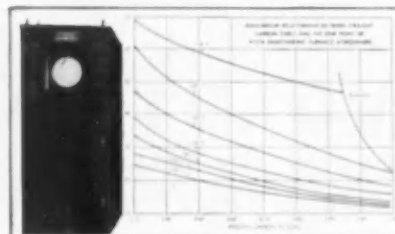
**PARCO LUBRITE**  
wear resistant for friction  
surfaces

**TROPICAL**  
heavy duty maintenance  
paints since 1883

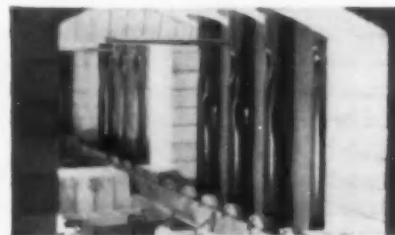
# HERE AT LINDBERG WE'RE GETTING YOU ABOUT A GREAT NEW FURNACE



The famous Lindberg Cyclone Furnace has been reducing costs and improving quality of tempering, annealing, nitriding, stress-relieving and non-ferrous heat treating for 20 years.



Lindberg dew-point equilibrium curves accurately determine carbon potential in endothermic atmospheres and Lindberg Carbotrol unit controls these values automatically.



The Lindberg vertical radiant tube is only 59 in. long, weighs only 29 lbs. Easy to change. Exclusive "dimple" design insures combustion over length of tube.

There's real furnace news coming from Lindberg.

When metal needs heat Lindberg, over the years, has consistently pioneered better ways to apply it. A revolutionary new development to be announced in September climaxes a long list of Lindberg firsts.

In 1935 Lindberg's famous Cyclone furnace replaced radiation convection with high speed 100% forced convection.

The world's first high temperature (2200° F.) Hyen (endothermic) gas generator was introduced in 1942.

1943 saw 100% high speed convection pushed up into the high temperature field (1750° F.).

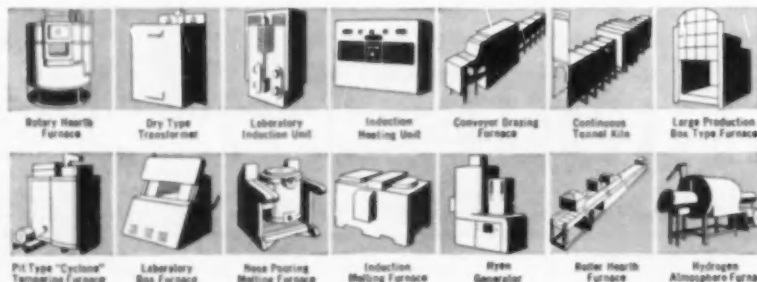
The introduction of the two-chamber aluminum induction melting furnace came in 1947.

In 1948 Lindberg developed the first high frequency method for measuring carbon and sulphur in steel.

An enamel-coated alloy, vertical radiant tube, providing fast heat release in relatively short length for carbonitriding and carburizing, was brought out in 1953.

In 1954 Lindberg released the first comprehensive set of dew-point equilibrium curves to determine accurately carbon potential in endothermic atmospheres and also introduced the Lindberg Carbotrol unit to control these values automatically.

You can continue to look to Lindberg for the improvement of the processes of applying heat industrially. Particularly, watch for the announcement next month of one of the most revolutionary developments ever made in the furnace field.



Lindberg manufactures many kinds of equipment in the industrial heating and related fields. A few of these are symbolized here. If you are interested in any of these, please write us for the specifics on them, or get in touch with your nearest Lindberg Field Engineer. (See your classified telephone book.)



# READY TO TELL DEVELOPMENT!



Here at Lindberg, engineers and technicians have been working for months on a development that we believe is one of the most important in the industrial furnace field. We can't tell you all about it until September but we are so sure that it is important news to everyone working with metal that we are giving this advance notice of what's coming from Lindberg. Look for the announcement in September trade papers or, if you're in Chicago September 6 to 16 for the big shows, arrange to see this development at one of the special showings in our plant.



We are planning a series of showings of this new development at our plant during the period of the three Chicago Shows, September 6 to 16. If you are in Chicago, phone MOnroe 6-3443 and we'll make arrangements for your attendance at one of these showings.

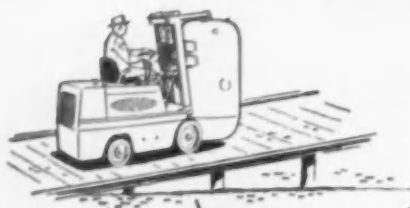
## **LINDBERG** ENGINEERING COMPANY

2491 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 Regentview Ave., at Downey, California

Company, Ltd., Weybridge, Surrey, England • Etablissements Jean Aubé, Paris • Lindberg Industrie Ofenbau, Gross Auheim, Germany

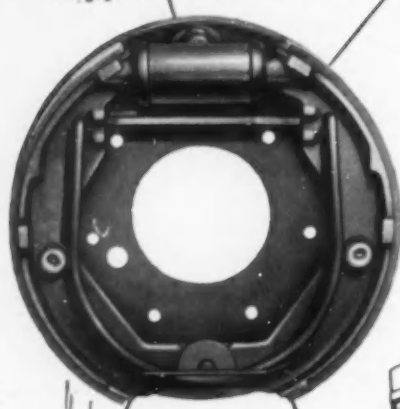
**IF IT MOVES  
WE CAN STOP IT!**



# TDA BRAKES

*...for every industrial  
or automotive application where  
braking is required!*

**FSH...Floating Shoe Hydraulic Brake  
Designed for close control with heavy loads**



## Mechanical Parking Brake Hook-up

A separate parking brake is no longer necessary with FSH. If specified, the FSH Brake can be furnished with a mechanical parking brake linkage that functions independently of the hydraulic system.



## Long Life Lining

Brake lining is bonded to the shoe to give maximum lining area with no lining waste.



## Positive Automatic Adjustment

One application of the foot pedal sets the automatic adjustment. No further adjustment of the brake is required during the full life of the brake lining.



## Positive Contact Drum Seal

For applications where a sealed brake is required, the FSH is designed to incorporate a seal between the brake backing plate and brake drum.



The FSH Brake presents some remarkable new advantages to manufacturers who need a better, longer lasting Hydraulic Brake. The features of the FSH were developed after years of field work and laboratory study. These advantages can be a road to new economy and better control for *your* equipment.

FSH Brake shoes operate with a floating action. This eliminates the danger of liner loads concentrating at one point . . . permits the shoe to follow the drum. The result of this even load distribution is a highly dependable, controllable brake—in *either direction* of travel. This is especially important when stacking heavy loads at high levels and maneuvering at close quarters.

**For Additional Information . . .** contact the Timken Brake Division. Complete details on the FSH Brake are available. And, a staff of experienced engineers can assist you with any brake problem you encounter.



# **NEW**

## **Automation in Drilling at Low Cost**

# **ARO**

### **AUTOMATIC and PAR-A-MATIC DRILLS**

Increased production . . . higher quality . . .  
fewer man hours! Controlled air and hydraulic  
feed . . . rapid traverse adjustment . . . ad-  
justable stroke length . . . use singly or in  
combinations. Write for bulletin 5546-T  
on Automatic and Par-A-Matic Drills.

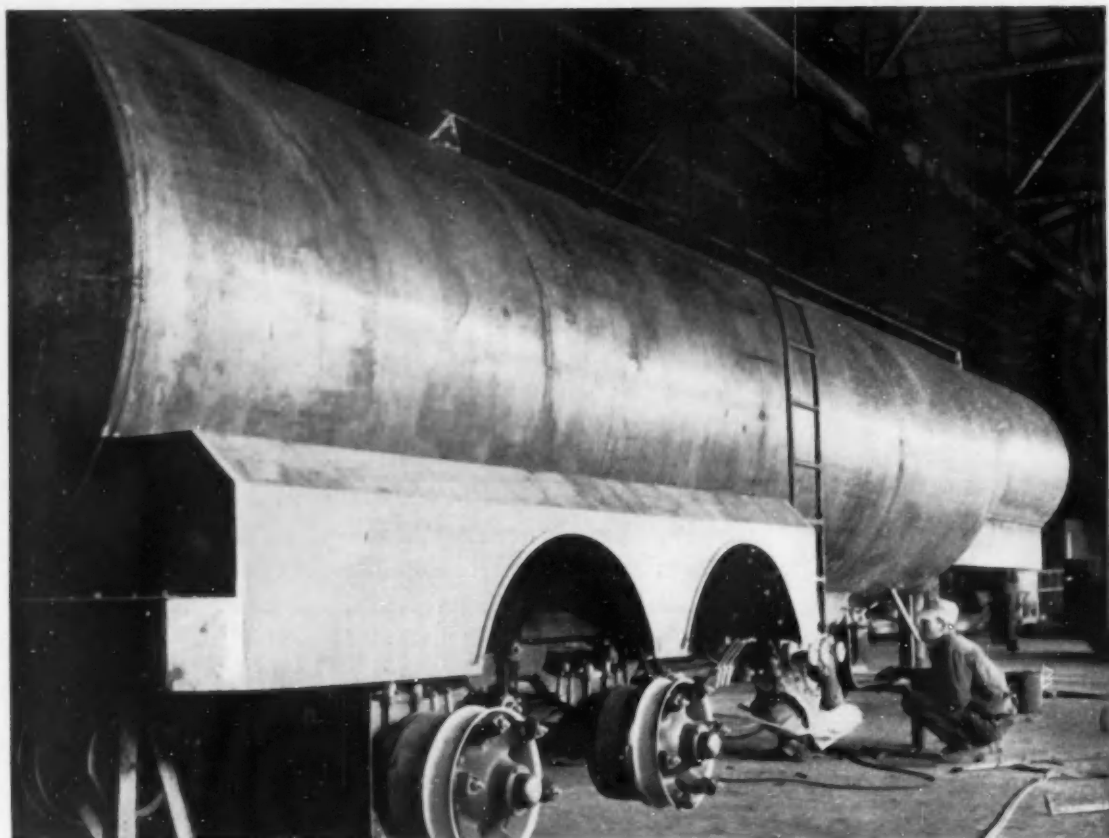
**THE ARO EQUIPMENT CORPORATION**  
Bryan and Cleveland, Ohio  
Aro Equipment of California, Los Angeles, Calif.  
Aro Equipment of Canada, Ltd.,  
Toronto 15, Ontario  
Offices in All Principal Cities

# **ARO**

### **AIR TOOLS**

Also . . . Air Hoists  
. . . Lubricating  
Equipment . . .  
Aircraft Products  
. . . Grease  
Fittings

**Mayari R** makes it lighter...stronger...longer lasting



## Star Tank & Trailer cuts deadweight 10 pct with Mayari R tank sheets

These tankers were designed to carry casin-head gas, under 17 psi. However, their manufacturer, Star Tank and Trailer Manufacturing Company, Rhome, Texas, says they are equally adept at hauling petroleum in any liquid form.

The all-welded trailer shown here has a capacity of 6650 gallons. By using Mayari R, the Star people were able to meet loading requirements with lighter gage sheets, thus cutting down overall trailer deadweight by 10 pct. In addition, they furnished their customer with a more corrosion-resistant trailer which would hold up longer than a tank made of plain carbon steel.

Greater strength... superior corrosion-resistance... easy weldability... these are but a few of the advantages of high-strength, low-alloy Mayari R steel. Automotive vehicle manufacturers all over the country are making increased use of this versatile steel to the benefit of their



customers, and at a profit to themselves. Our Catalog 353 deals thoroughly with this subject of automotive applications. You can get a copy promptly by a request to the nearest Bethlehem sales office.

**BETHLEHEM STEEL COMPANY**  
BETHLEHEM, PA.

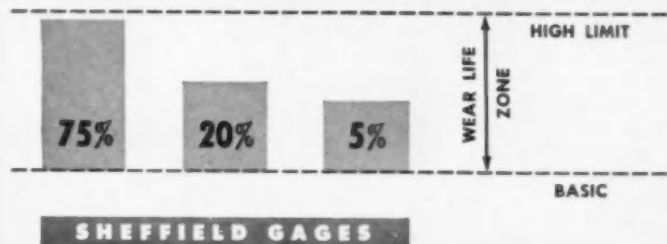
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



# WHY SHEFFIELD THREAD GAGES

## Wear Longer

Special supersensitive production equipment controlled by high amplification instruments, plus Master Craftsmen make it practicable to hold the finished size of Sheffield thread gages unusually close to the gagemaker's high tolerance limit.



Purchasers of Sheffield thread gages can, on the average, expect to receive 75% of them within the upper third of the gagemaker's tolerance zone, 20% about half way and the rest between that point and basic.

**SPECIFY SHEFFIELD** and get more for your gage dollars.

**SPECIFY "Reversible" Thread Plug Gages** and save even more.

Gage Division, The Sheffield Corporation  
Dayton 1, Ohio, U.S.A.

See us at the  
Machine Tool Show, Booth 1305



# SHEFFIELD

MANUFACTURE AND MEASUREMENT FOR MANKIND





# New Aspects of Amended Renegotiation Act

(Continued from page 49)

more closely during the months to come.

While it is true, as stated by Congressman Cooper, many items of military equipment are continuously evolving, nevertheless, the major period of research, experimentation and development has passed. Contractors have, to a large extent, organized their production lines, shipping facilities, inspection departments, etc., so as to achieve maximum efficiency at lowest cost. Many orders are for the same or similar items and both research and production problems are greatly reduced. Thus the Board may well feel that lower profit percentages in various cases would be fair and reasonable.

The second point to remember is that there will be considerably fewer contractors renegotiated since the floor has been raised to \$500,000.00 in defense sales, general commercial articles exempted, and the new durable productive equipment exemption extended. Consequently, as the Board clears up its backlog of older cases, it will be better able to concentrate on the companies still subject to renegotiation. This means, of course, that it could prove extremely short-sighted to roll along on the assumption that a profit percentage that has received a clearance in the past will necessarily get similar treatment in the future.

## Self Renegotiation

Every company has a perfect right to seek for itself the maximum profit that can be justifiably earned and retained.

As one step in the struggle to hold on to profits once they have been earned, why not set up a company renegotiation panel to review your report before it is submitted to the Renegotiation Board? In other words, by utilizing the knowledge and experience gained from past renegotiation proceedings, analyze your future reports in an effort to determine probable or possible Government action with respect to your presentation and profits.

If, as the result of this self-renegotiation process, it is agreed that a refund is likely, or reasonably possible, you may resort to one or more of four courses of action:

1. Revise your report, including the

preparation of additional material which you believe may help your case.

2. Seek outside, expert advice and assistance in presenting your report.

3. Make a voluntary refund in an effort to forestall or mitigate a determination of excessive profits. (Generally speaking, this alternative can be more useful when employed prior to the close of your fiscal year.)

4. Make some provision to meet the anticipated or possible refund, however, a reserve earmarked for such a contingency is not recommended.

## Recent Modifications of 1951 Act

Although various efforts to abolish Renegotiation have met with no success, some important modifications have been made by Congressional action or board ruling, including:

1. Liberalization of the new durable productive equipment exemption to apply to prime contracts, as well as subcontracts; effective June 30, 1953.

2. Exemption of standard commercial articles and services where competitive conditions exist so as to reasonably prevent excessive profits; effective January 1, 1954.

3. Exemption of contracts obtained by competitive bid for "buildings, structures, improvements, and facilities," except military housing; effective January 1, 1955.

4. Elimination of small refunds; minimum now \$40,000.00 (fiscal years ending on or after June 30, 1953).

5. Lifting of floor to \$500,000.00; where company has less than this amount of Defense End Use Sales, they are not subject to renegotiation; effective June 30, 1953.

6. Reduction in paper work (use of statement of non-applicability for example).

## More Favorable Conditions for Small Business

The lifting of the floor to \$500,000.00 has not only removed the burden of preparing reports from many small defense contractors and reduced unprofitable Government paper work in numerous cases where determinations of excessive profits

would be small at best, but should also sweep aside one barrier which has kept some companies from bidding on Government contracts. Many a small company that is efficiently managed and has been securing plenty of profitable commercial orders has had little inducement to seek defense contracts.

Government work usually means stricter requirements, increased inspection costs, frequent changes in specifications, unanticipated expenses of one kind or another, and slower payments. When, to these disadvantages, there is added the expense and trouble of renegotiation reports, plus the possibility of a refund that might seriously restrict working capital at a critical time, it is hardly to be wondered that some businessmen have questioned if the game were worth the candle.

## A-C Supply System

(Continued from page 65)

range (1800 to 7200 generator rpm). A special regulator of the magnetic amplifier type makes the terminal voltage proportional to the frequency. A frequency-sensitive circuit in series with the control winding of the regulator provides constant field current for a given load, independent of speed. Thus a 440-v, 50-cycle squirrel cage motor would operate successfully from a 220-v, 25-cycle line, at one-half speed and power. How the system works is shown in the speed characteristic curve. The load characteristic curve shows how the combination maintains the required voltage at a given speed, regardless of the load.

Compact construction is shown by the fact that a three-kw, 220-v, three-phase 3600-rpm generator, 0.8 power factor, fits the NEMA 204 frame. The equivalent squirrel cage motor rating of four hp at 3600 rpm would be between the NEMA 224 and 225 frame sizes. The rotor is a solid casting with space-conserving end flanges, and with flat end brackets. A special compact slip ring and brush assembly helps provide a small, lightweight unit.



# News you can use about heat-treated castings

If you want the *news* on heat-treated castings, be sure to send for Campbell, Wyant and Cannon's new booklet "One Source!" In it is told the story of CWC's extensive heat-treating facilities . . . how castings made by CWC give greater wear resistance, increased machinability or dimensional stability. "One Source" also contains interesting and important information on all of the subjects listed below. It's a booklet of value to everyone directly or indirectly concerned with castings. Get your free copy now!

*Whatever Your Requirements*  
**GO TO ONE SOURCE**



**CAMPBELL, WYANT AND CANNON**  
**FOUNDRY COMPANY**

Muskegon, Michigan

GRAY IRON, ALLOY IRON AND STEEL CASTINGS

- \* Intricate Castings
- \* Castings with Special Properties
- \* General Purpose Castings
- \* Heat-Treated Castings
- \* Steel Castings
- \* Centrifugal Castings
- \* Castings in Limited Quantities
- \* Castings in Volume



- greater production
- lower costs
- smaller investment

## PRECISION DESIGNED AND BUILT TO MEET THE REQUIREMENTS OF THE AGE OF AUTOMATION

### Dixi 60

#### Horizontal Jig Borer

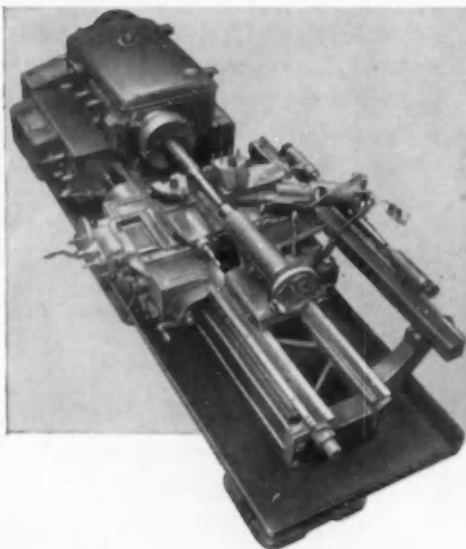
##### With 5 optical microscopes

A precision machine for boring, drilling, reaming, and milling work. Built-in rotary table with optical microscope can be rotated 360°. Headstock, column, and table settings by optical microscopes to insure overall accuracy of .0002". Table and spindle head have variable hydraulic feed. Mechanical spindle feed can be changed without stopping spindle and is provided with automatic depth stop.

No. 40 taper spindle. Spindle speeds 32-1350 R.P.M. Feeds .0015"—.010" per rev. Table size 28 1/4" x 32 1/2" max. distance spindle to table 19 1/4". Table travel 23 1/2". Spindle travel 24.4".



One of the world's most accurate Swiss-made machine tools



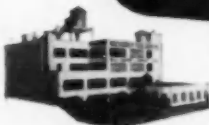
### Heavy Duty Lathe High Precision, Reliability, Top Performance Schaefer Model UN-450

Twin cross slides. Copies from cylindrical or flat template either longitudinally or cross. Twin slides permit rough turning and finish turning in the same operation in many instances. Swings 17 1/4" over bed, 9" over carriage, 20-5/64" over gap. Center distance 60". Spindle speeds 31.5 to 1400 R.P.M.

Hydraulic copying attachment can be removed to permit use as a regular twin slide lathe when necessary. 10 H.P. motor drive to spindle. Separate motors for coolant and hydraulic pump. A production lathe built to tool room standards.

- Guaranteed Service by Trained Staff
- Engineering Staff will make recommendations based on your requirements
- Spare parts in Stock
- Your Operators Trained
- Early Deliveries — Some from Stock
- Competitive Prices
- Financing and Rental Plans to Meet Your Requirements

Many More Machines for Every Operation  
Write for free illustrated brochure 100,  
or state your specific requirements



Write for complete details and prices to Dept. 21  
**M.B.I. EXPORT & IMPORT LTD.**  
A Division of Machinery Builders Inc.  
475 Grand Concourse, Bronx 51, N. Y.  
"Over 20 years experience in designing & building machinery"  
CABLE ADDRESS: Machbuild New York  
Phone: MOHAYVEN 5-0900

Our Headquarters in New York City



# YOU GET UNIFORM TEST BAR QUALITY IN LARGE CASTINGS

## When you use **FRONTIER 40-E Aluminum Alloy!**

● One of the most unusual features of Frontier 40-E Aluminum Alloy is the fact that the physical properties which spell high quality in the test bar appear uniformly throughout a large casting. And since Frontier 40-E is a non-heat-treated aluminum alloy, the high strength physical properties are obtained by natural aging at room temperatures. The high yield strength of Frontier 40-E Aluminum Alloy is of special value in designing parts that must be light in weight and yet resist distortion or deformation. If your products or parts would be better if they were lighter . . . you need Frontier 40-E Aluminum Alloy.

### *Here's Proof -*

	TEST BAR	AXLE
Yield Strength	23,500	22,700
Tensile Strength	36,600	35,500
Elongation	7.5	7.5

### OTHER PLUS VALUES

- Shock Resistance. Exceptional ability to withstand direct and transmitted shock.
- Corrosion Resistance. Even under stress.
- Machineability. Excellent.
- Fine grain withstands high pressure.

- Technical advice and service is available to designers and licensees.



Please send me a copy of the Alloy Data Book giving engineering and metallurgical facts on the physical properties of Frontier "40-E".

Name.....

Company.....

Address.....

City.....

State.....



## FRONTIER BRONZE CORPORATION

4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

## Car Output Dips in August; Record Year Still Foreseen

Production of automobiles continues in high gear, although this month (August) shows signs of tapering off as plant shutdowns begin for new model changeovers. With July's output well over 625,000 units, production for the seven months approached the five million mark, and it is now likely that the industry will build 1½ million cars during the current quarter.

Total output of 7.5 million cars this year is highly likely, even if monthly output should drop to a 500,000-a-month rate during the remaining months. Monthly output since the beginning of the year has averaged above the 600,000 mark.

There seems little doubt that both car sales and production records will be shattered this year, even though an output lull is ahead. The present production record is 6.6 million cars.

Despite reports that dealer inventories are beginning to pile up again, the strongest merchandising by dealers in years is now underway to clean out the 1955 models. Some industry sources estimate that retail car sales through the end of July topped the four million mark.



## MORRIS ISIS

Morris Motors, Ltd., has extended its range of vehicles with the new Isis sedan and station wagon. Body resembles the Oxford and Cowley, but wheelbase has been lengthened to eight ft. 11½ in. to increase internal roominess. The six-cylinder engine is similar to that of the Austin A90 and develops 26 bhp at 4250 rpm. Front suspension is by torsion bars. The station wagon with 65 cu ft of cargo space features a large glass area and double tail doors.

## FORMER RECORDS FALL BY WAYSIDE DURING FIRST HALF 1955 U. S. Motor Vehicle Factory Sales\*

	Passenger Cars	Trucks	Buses	Totals	
				1955	1954
January	89,576	190	725,379	815,145	801,134
February	87,705	178	744,942	832,825	834,145
March	791,280	102,982	325	894,587	833,003
April	753,434	127,887	519	881,840	831,709
May	721,139	127,941	313	849,393	868,562
June	647,650	119,215	308	767,173	908,870
Total—Six Months	4,228,729	634,772	1,832	4,865,333	5,537,599

## 1955 U. S. Motor Truck Factory Sales by G.V.W.\*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-18,000	18,001-20,000	Over 20,000	Total
January	42,396	16,055	4,059	16,489	4,741	3,279	3,657	89,676
February	30,636	11,277	2,645	11,911	3,875	3,380	3,937	67,661
March	42,616	18,275	4,156	19,176	4,363	3,467	4,720	102,962
April	61,365	22,170	4,834	23,779	6,417	4,230	6,084	122,867
May	60,287	21,721	5,149	24,420	6,406	3,734	6,222	122,941
June	52,720	20,753	4,105	22,877	7,709	4,393	6,658	119,215
Total—6 Mos. 1955	295,629	106,259	24,947	116,652	32,515	21,701	32,079	634,772
Total—6 Mos. 1954	256,444	103,397	21,982	106,612	24,944	28,949	21,176	563,904

\* Automobile Manufacturers Association.

## Fairchild Acquires Assets Of McCulloch Subsidiary

The purchase of the assets of the Rhodes Lewis Co., a subsidiary of McCulloch Motors Corp., by Fairchild Engine and Airplane Corp., has been announced.

The assets involved consist of Rhodes Lewis products, patents, tooling, and necessary capital equipment for production of the entire Rhodes

Lewis product line of high pressure compressors, valves, ejectors, and related items. The Rhodes Lewis products will be integrated with the products of Fairchild's Stratos Div.

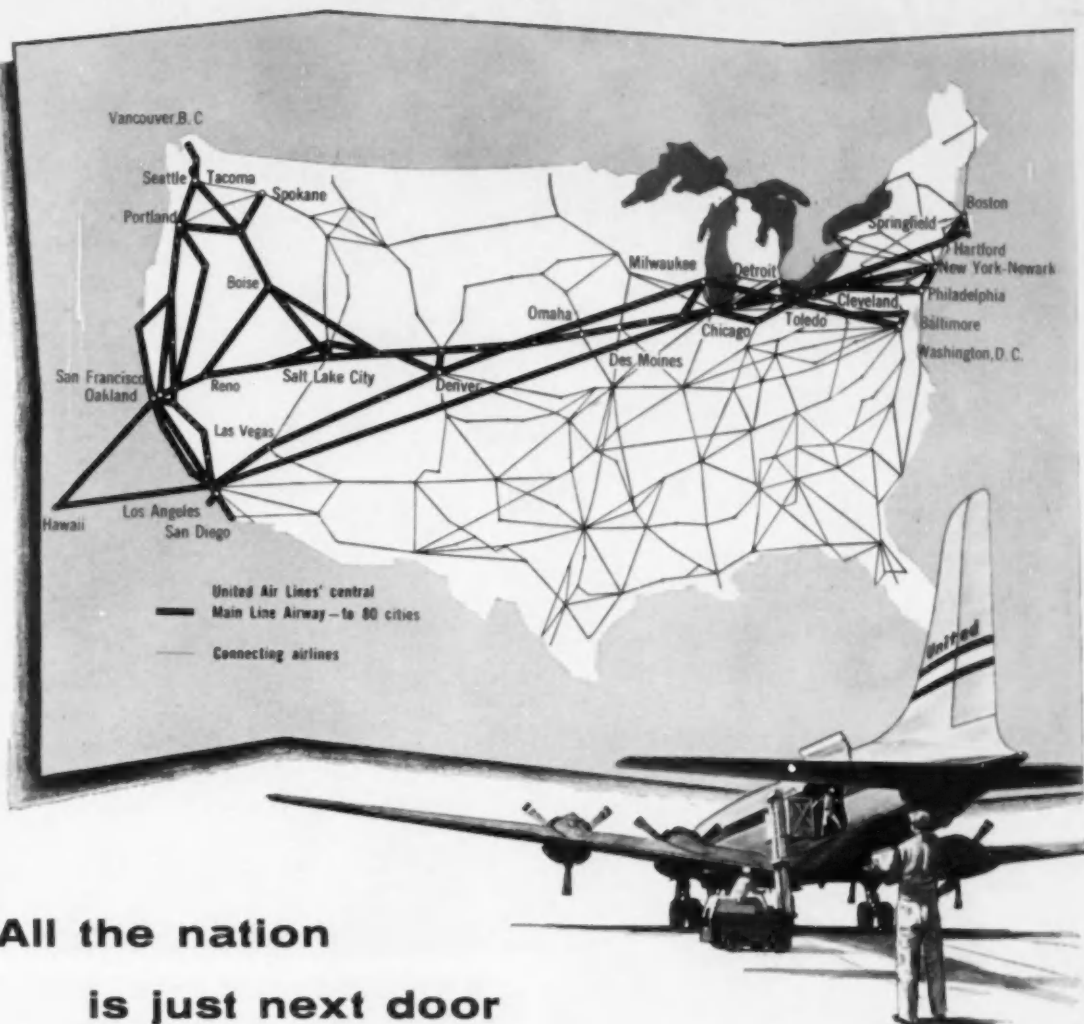
Stratos will assume direction of the Rhodes Lewis sales and engineering program. Production facilities will be maintained in the Los Angeles area.

## Eight-Hp Aircooled Diesel Weighs Only 235 Lb Total

Recently introduced at a press preview in New York City by Diesel Power, Inc., of Greenville, Pa., was a small lightweight, aircooled, single-cylinder Diesel engine. Developing eight hp and weighing 235 lb, it is intended for such uses as running small tractors, propelling small boats, pumping water, etc. Aluminum alloys have been used extensively for such parts as the crankcase and blower components.

Foreseeing a sizable market for the engine in South America as well as in the U. S., Diesel Power has signed an agreement with the Brazilian concern of Companhia de Anilinas to produce the engine. Initial output the first year by the latter will be 1000 units.





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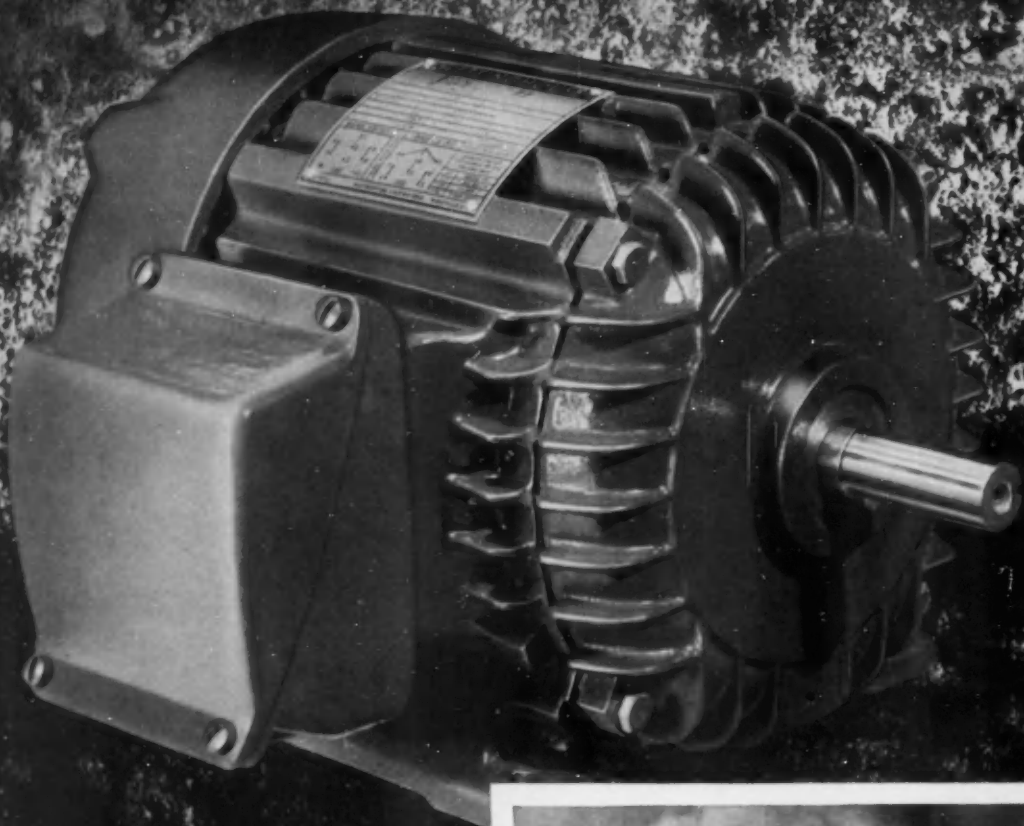
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\*Du Pont Registered Trade-Mark

# FACT:

The new ***Life-Line A*** is the most corrosion-resistant motor on the market

The corrosive action of chemicals takes a heavy toll on conventional motors. The new Westinghouse Life-Line® "A" motor offers more protection against corrosive atmospheres than any other motor you can buy. How?

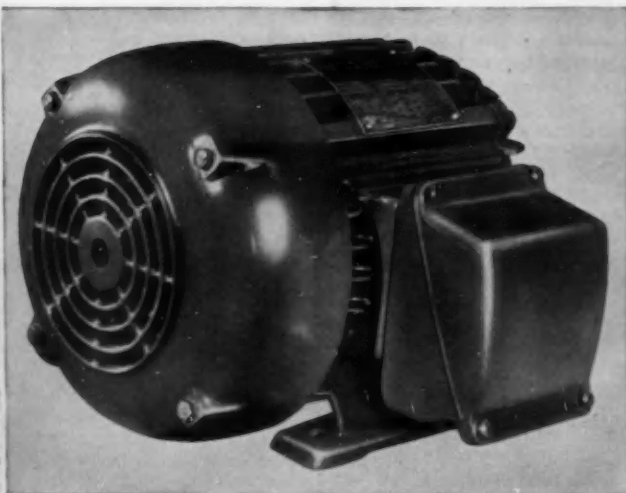
Because the combined improvements in insulation, housing and bearing design give

unsurpassed protection against any contamination. It takes the right combination of such improvements in *all three systems*—electrical, mechanical and lubrication—to make the Life-Line "A" industry's most preferred power package.

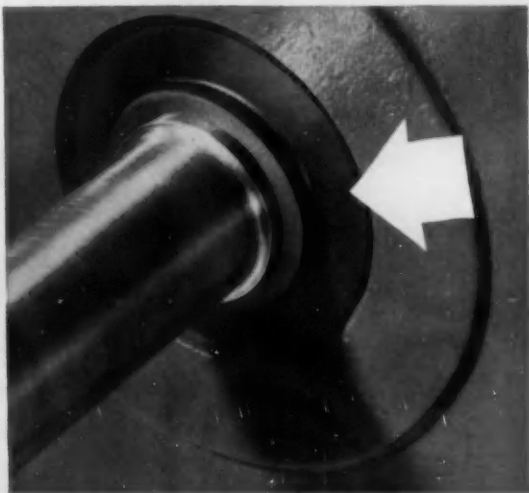
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J-21881

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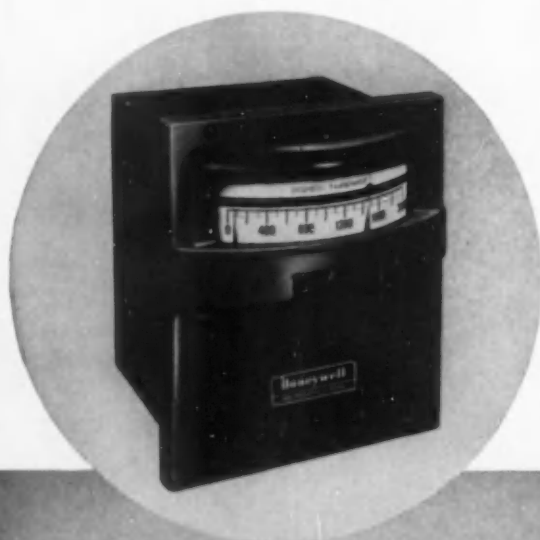
**Mechanical System Fact**—New cast-iron frames and brackets utilize the finest grained castings with uniformly thick wall sections precisely fitted and sealed. Molded glass plastic cooling fans on totally-enclosed types are chemically inert.



**Lubrication System Fact**—The new pre-lubricated Life-Line "A" bearing features a "4-way seal"—two seals on each side. Totally-enclosed types have additional neoprene flinger which assures bearing protection in any corrosive application.



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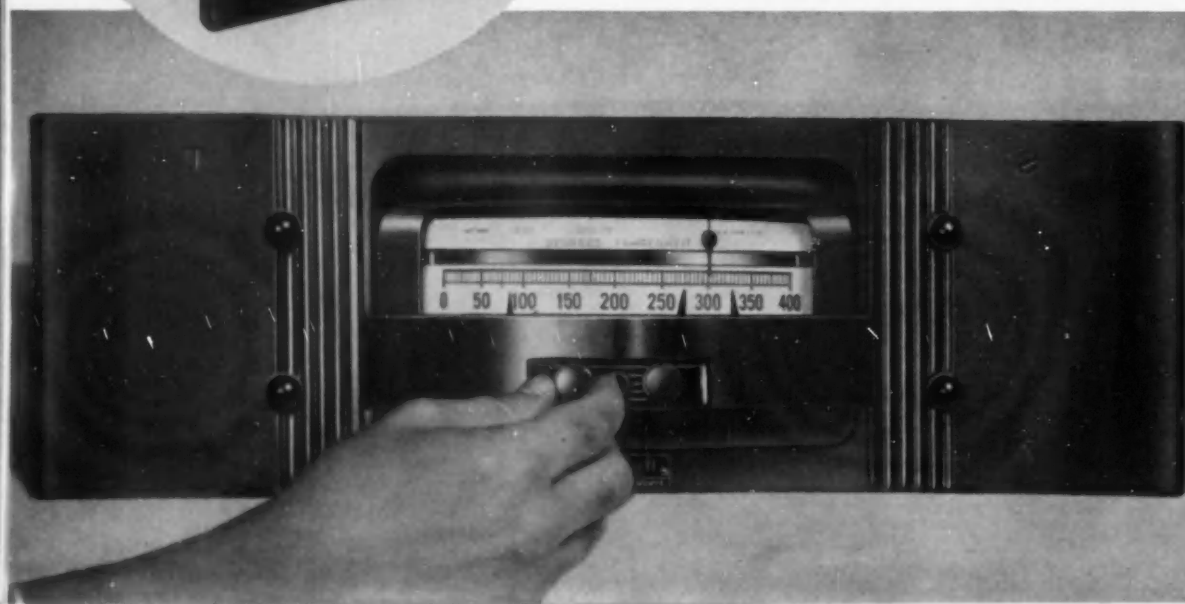


## **Pyr-O-Vane Controllers**

*Horizontal-case model fits standard 19" relay racks. Available in a choice of control actions, including three-zone control with neutral zone adjustable from 0 to 100%, or 0 to 10%. Pre-wired panel permits checking of thermocouple or millivoltmeter without disconnecting wiring.*

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Both types are available with "snap action" electronic vane control; on-off, two-position and three-position; and with pulse-type time-proportioning control. They are designed for fail-safe operation, and are virtually unaffected by changes in line voltage, humidity and temperature. Supplied with either thermocouple or *Radiamatic®* calibrations.





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Now available in both horizontal- and vertical-case models, *Protect-O-Vane* instruments afford economical insurance against overheat damage to expensive furnaces. They operate in conjunction with primary controllers . . . which may be either *Pyr-O-Vane* models or recording instruments . . . to close the fuel valve or open electric heating circuits whenever the safe temperature limit is exceeded. At the same time, they can actuate signal lights or audible alarms. Their safety circuit prevents re-starting the process until temperature has dropped below the safe limit.

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Behind all these instruments stands more than 90 years of experience with millivoltmeter instrumentation . . . plus the nation-wide engineering and field service facilities of the Honeywell organization. For a discussion on how these economical controllers can be put to work on your processes or on the equipment you manufacture, call your local Honeywell sales engineer. He's as near as your phone.

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Industrial Division, Wayne and Windrim  
Avenues, Philadelphia 44, Pa.

● REFERENCE DATA: Write for Catalog 1053, "Millivoltmeter Type Instruments" . . . and for Bulletin 1060, "Horizontal Case Millivoltmeter Controllers."



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*First in Controls*



# Multiform BIG BROTHER BENDER

Model 888



SMALLER  
MODELS  
AVAILABLE



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender.

## AIR OPERATED MODELS IN FOUR SIZES

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches — punching and blanking dies extra. Will punch holes up to 1" and form material up to 1/4" thick by 4" wide. We also build smaller models, hand or air operated, for bending materials up to 1/8" x 1 1/2".

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in inch grams  
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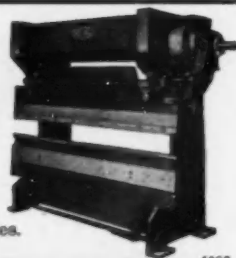
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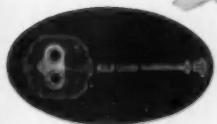
Offices: Atlanta, Chicago, Cleveland, Detroit, Fort Worth, Indianapolis, Newark, New York, Pittsburgh, Racine, St. Louis, St. Paul, San Francisco, Seattle; Norwalk, Calif.; Stratford, Conn.; Charlotte, N. C.; Seneca Falls, N.Y.; Jenkintown, Pa.; Westwood, Mass.

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*to beat Competition!*



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The valves are pre-set at the factory, for specified pressure, under conditions duplicating those in which the pump will be used.

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CORPORATION  
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Light, compact, durable, quiet—that's the story of the new TULSA POWER TAKE-OFFS . . . The heat-treated aluminum alloy housings permit more payload . . . Compact design saves installation man-hours . . . Quality and durability of gears, shafts, and yokes are assured because of "controlled atmosphere" carburizing and hardening . . . As an extra refinement, all gears are shaved resulting in extremely quiet operation. And last but not least, prices are very low. One-speed forward and two-speeds forward models, all reversible, are available for every power take-off application.



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TULSA, OKLAHOMA DIVISION OF  
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GROOVE WEAR**

**Double Bonded**

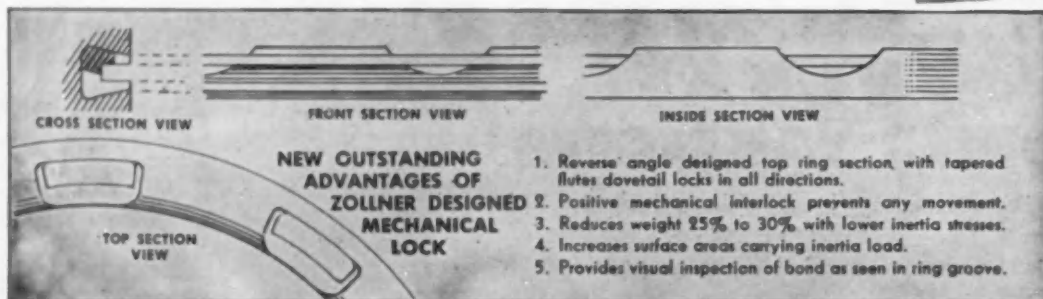
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Al-Fin Bond

MECHANICALLY  
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ZOLLNER

"Ni-Resist" Iron Top Ring Groove  
**BOND O-LOC**  
For Extra Heavy Duty Service  
**PISTONS**

Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section permanently incorporated by both Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



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ENGINEERING

• PRECISION  
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in cooperation  
with engine  
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*Bob Sweikert*



2nd—TONY BETTENHAUSEN

"Big or small, in every race my car is equipped with Everlock lock washers. I know I can depend on 'em."

*Tony Bettenhausen*



3rd—JIM DAVIES

"Everlock lock washers held perfectly tight all through the terrific punishment of the race."

*Jim Davies*

EVERLOCK lock washers keep vital connections tight under the unmerciful pounding of competitive racing. Their exclusive alternating chisel edges provide a *double surface grip* — actually bite into both screw and work with a *permanent, vibration-proof grip*.

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Lock Nuts



Terminals

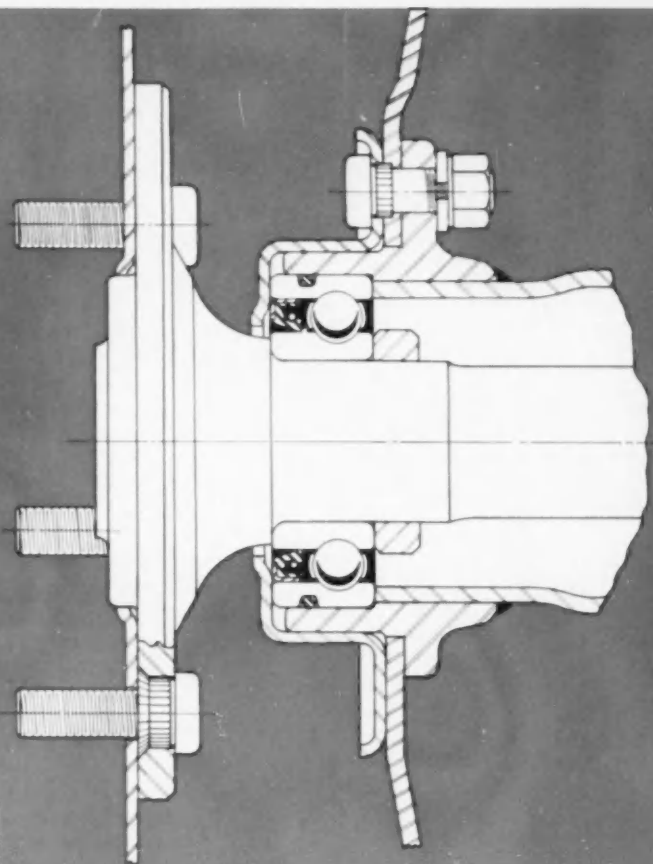


## FREE CATALOG

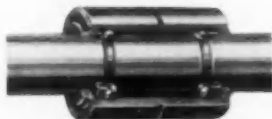
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**Another  
New Departure  
in the  
AUTO  
INDUSTRY!**



**Lubricated-for-Life  
Ball Bearing**



**Fan and Pump Shaft  
Ball Bearing**



**Double-Row Angular-  
Contact Ball Bearing**



In an industry where dollars and sense savings really count for every component, New Departure has introduced in the past many money-, space- and maintenance-saving designs. Among these "New Departures" are the self-sealed pump shaft ball bearing, the double-row angular-contact and lubricated-for-life ball bearings.

The drawing, above, illustrates New Departure's latest contribution in cost-cutting designs . . . a new rear wheel bearing. Here, the seal for the wheel mounting is located within the precision rings of the bearing, providing maximum sealing efficiency. An "O" ring on the outside diameter prevents seepage of axle oil past the bearing outer ring.

The result? A simplified mounting that greatly reduces machining operations and axle parts . . . permits easier, quicker servicing. New Departure, Division of General Motors, Bristol, Connecticut.

**NEW DEPARTURE**  
**BALL BEARINGS**



NOTHING ROLLS LIKE A BALL